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Status Report on Opacity Calculations
Supplement II

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Status Report on Opacity Calculations
Supplement II

by

Walter F. Huebner
John Generosa*
Richard Harris*

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*Air Force Weapons Laboratory, Kirtland Air Force Base,
N. M. 87117

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STATUS REPORT ON OPACITY CALCULATIONS

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ABSTRACT

The results of a survey in the opacity field have been compiled and are presented here categorized according to the various phases of an opacity calculation. The categories include: energy levels, wave functions, electronic occupation, bound-free transitions, free-free transitions, bound-bound transitions, scattering, molecular transitions and complete opacity calculations. A list of scientists recently active in one or more of these fields is included.

I. Introduction. Since the time the first Report of this series was issued in 1963 many advances have been made in the opacity field. Exchange of information has increased through preprints, reprints, personal contacts and conferences (besides the Opacity Conferences held at Kirtland Air Force Base, there have been a number of conferences in closely related fields). It thus appears that many of the objectives of these Status Reports have been met. However, the increasing application of the radiation transport equation using absorption coefficients averaged over several smaller frequency ranges requires more detailed and more exact knowledge of the monochromatic absorption coefficient than was necessary for the calculation of the Rosseland or the Planck mean opacity. Considerable effort is also spent in non-local thermodynamic equilibrium cases, thus adding further complications. Considering these new demands it becomes clear that methods need to be developed to meet the requirements of the more detailed information in large quantities with increased accuracy by codes requiring little computer time. It is hoped that this supplement will aid in gathering this information and stimulate research to fill the still existing gaps.

This report differs only slightly in format from IAMS-3002 and IAMS-3002 Supplement I. It again consists of an alphabetical subject index, an alphabetical author index and an up dated list of researchers in the opacity field. The subject index contains a combination of letters and numbers indicating where the information can be found in the author index. These combinations of letters and numbers are preceded by an "O", "I", or "II". The "O" indicates that the work is reported in IAMS-3002 which is the "Original" report. The "I" indicates the work is contained in Supplement I, and the II is Supplement II, which is the present report. The author index contains information obtained from a questionnaire as completed by those surveyed, and also contains considerable information from a literature survey. Due to the necessary correlation of this report with the preceding issues, the author index is not in absolute alphabetical order according to the subject index code. The survey for each author is also broken down according to work completed, in progress, or planned. Work previously reported as work in progress or planned in IAMS-3002 and Supplement I is only listed again if it has been completed. Present trends and interests in opacities

have been the guiding criteria for selecting work for inclusion in this report, but a few articles of fundamental importance or of historical interest are also included, although the list of these articles is far from being complete. References listed under the heading of "Opacity,..." may be expected to contain information not specifically listed under another heading such as: energy levels, occupation numbers, bound-free transitions, etc.

The survey has been restricted to "obtaining" opacities, and applications and uses of opacities are not included. Similarly readily available books containing sections on opacities or any phases important in the calculation of opacities are not included. However, the following publications should be of special interest:

Condon and Shortley: Theory of Atomic Spectra (Revised edition to be published).

Cox: Stellar Absorption Coefficients and Opacities (Chapter 3, in Stellar Structure: Allen and McLaughlin, Editors) (1965).

Main: Experimental Measurements of Molecular Electronic Transition Probabilities: A Survey of Activities in Laboratories in North America and Western Europe. Heliodyne Corp. Research Note RN 28, (1966).

Glennon and Wiese: Bibliography on Atomic Transition Probabilities: NBS Miscellaneous Publication 278 (1966).

II. Subject Index.

Absorption coefficients, continuous: O/Berg-1, Gi-1, Hua-1, Kel-1, Kr-1, Pe-21, Sc-1, Zw-1
II/Cha-2, Hue-2, Jo-2, Mats-1, Wei-1, Wilk-1, Zw-3
-- monochromatic: O/Cox-1, Cox-2, Pe-23, Pl-1, Ste-1
I/Chu-2,
II/Ash-1, Bran-1, Chiu-1, Chu-4, Chu-5, Chu-6, Chu-7, Cur-1, Ed-1, Gen-1, Hue-2, Jac-1, Jun-1, Mct-1, Pat-1, Pea-4, Pfe-2, You-1
-- Planck mean: see Opacity, Planck mean
-- Rosseland mean: see Opacity, Rosseland mean
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I/A-5, Bre-8, Chu-2, Chu-3, Gi-2, Gi-3, Jo-2
II/A-9, All-1, Ash-1, Bran-1, Bib-1, Chu-4,

Chu-5, Chu-6, Chu-7, Cur-1, Dic-3, Fo-2, Gen-1, Gi-5, Jeu-1, Jeu-2, Jeu-3, Jeu-4, Jeu-5, Jeu-6, Jeu-7, Jeu-8, Jeu-9, Jeu-10, Ki-7, Ki-11, Mai-1, Mai-2, Mai-4, Mj-2, Ner-1, Wen-1, Wen-2, Wra-1

Alkali elements: I/W-1, see also specific elements

Aluminum: O/Mey-2, Ste-1

I/Bau-1, Bie-2, Kat-1

II/Dic-1, Kra-3, Par-1, Pea-3, Rob-3, Roe-1, W-5, Wie-9

Argon: O/Cz-1, Sc-1, We-1

I/Che-3, Che-11

II/Che-15, Dic-3, Gay-1, Gi-5, Golu-1, Gre-1, Huf-1, Kl-3, Mal-1, Sc-2, Sc-3, Wa-1, Wu-1

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Astrophysical Opacity: see Opacity, astrophysical

Atomic energy levels: see Energy levels

- response functions: O/Bra-1, Bra-2

II/Bra-3, Bra-5

- spectral lines: see Bound-bound transitions

- transition probabilities: see Oscillator strengths, Bound-bound transitions, Bound-free transitions, Free-free transitions

- wave functions: see Wave functions

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I/Kell-1, Pfe-1

II/St-1 Wie-6

Boron: O/Bern-1

I/Kell-1

II/Law-5, Wie-6

Bound-bound transitions: O/Bre-1, Che-1, Ha-1,

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Che-2, Che-3, Che-4, Che-5, Che-6, Che-7,

Che-8, Che-9, Che-10, Che-11, Che-12, Che-13,

Che-14, Je-1, Lab-1, Pfe-1, Sh-2, So-1, Tr-1,

Tr-2, Tr-3, Tr-4, W-1

II/A-8, Che-15, Che-16, Che-17, Che-18, Chia-1,

Coo-1, De-2, Dic-1, Du-1, Er-1, Ga-1, Ga-2,

Fra-1, Hal-1, Han-1, Her-1, Hof-2, Hue-3,

Kanc-1, Kell-3, Kl-1, Kl-2, Kl-3, Kor-1, Kra-1,

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Moi-1, Mu-1, Nab-1, Nag-5, Nak-1, Ner-1, Ols-2,

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Pee-7, Pfe-6, Pfe-7, Pr-1, Ris-1, Rob-1, Rob-2,

Rob-3, Scho-1, Sh-3, Shu-1, Sobe-1, Sobe-2,

St-1, Ste-2, Ste-3, Ti-1, Tie-1, Wie-6, Wie-7,

Wie-8, Wie-9, Wilki-1, Y-1, You-1, Zap-1, Zar-3,

Zw-2

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 Bra-3, Breh-1, Co-1, Co-2, Co-3, Cod-2, Dou-1,
 Gu-1, Hen-1, Hue-4, Huf-1, Hul-1, Hul-2, J-4,
 Jo-2, Kra-1, Li-2, Lu-1, Lu-2, Mat-1, Mate-1,
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 I/Bie-2, Bol-4, Kell-1, Pfe-1
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 Mart-2, Mj-3, Mosk-1, Ni-7, Ni-10, Pea-3, Pea-4,
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 Cl-1, Co-3, Dav-1, Deu-1, Dic-3, Doug-1, Dow-2,
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 Fi-1, Fo-1, Fo-2, Fr-1, Gold-1, Goo-1, Hale-1,
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 - , polyatomic: II/Ant-1, Cai-1, Cot-1, Cur-1,
 Da-1, Gra-1, Grib-1, Hig-1, John-1, Jac-1,
 Jeu-1, Lap-4, Lav-1, Lud-1, Lud-2, Lud-3,
 Miln-1, Pe-26, Pe-27, Var-1
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 Mercury: O/Coh-1
 II/Cu-4
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 I/A-5, A-6, Bol-3, Bre-6, Bre-8, Gi-3, Gi-4,
 Kell-2, Lab-1, Pfe-1,
 II/Ap-1, Ap-2, Ap-3, Bear-1, Bren-1, Brog-1,
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 Dun-1, Dunn-1, Faw-1, Fo-1, Fo-2, Gi-5, Hal-1,
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 Jeu-6, Jeu-8, Jeu-9, Jo-2, Jos-1, Jos-2, Jos-4,
 Jos-5, Jos-7, Jos-8, Kab-1, Kas-1, Kell-3,
 Ki-8, Ki-9, Ki-10, Ki-11, Kul-1, Las-1, Law-5,
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 Mil-2, Mil-3, Mj-1, Mosk-1, Mul-1, Nes-1, Ni-8,
 Ni-12, Ohr-1, Pea-3, Pea-4, Pr-1, Rei-1, Sa-3,
 Sc-4, Scho-1, She-1, Sob-1, Sob-3, Sob-4, Sol-3,
 Stoe-1, Tan-1, Va-1, Va-2, Va-3, Va-4, Va-5,
 Va-6, Va-7, Va-8, Wen-1, Wen-2, Wie-6, Wra-1,
 Wra-2, Wra-3
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 I/Gaus-1, J-2
 II/Bod-1, Cha-2, Mats-1, Mats-2
 - conductive: O/Cox-1, Mars-1, Mes-1
 - continuous: O/A-1, A-3, Bern-1, Cha-1, Mars-1,
 Mi-1, Pe-21, Pe-22, Sa-1, Sh-1, Ste-1, Str-1,
 Zi-1, Zi-2
 I/Ost-1, Ost-2, Ost-3, Ost-4, Ost-6, Sol-1,
 Sol-2
 II/A-5, Ash-1, Bib-1, Bod-1, Cha-1, Cur-1,
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 Jeu-3, Jeu-4, Jeu-5, Jeu-6, Jeu-7, Jeu-8, Jeu-9,
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 Mal-1, Ner-1, Pee-5, Pr-1, Rei-1, Rei-2, Rob-1,
 Rob-3, Sp-2, Scha-1, Schw-1, Shu-1, Sob-1,
 Sob-3, Sob-4, Sp-2, St-1, Ste-3, Wen-1, Wen-2,
 Wen-3, Wen-4, Wie-7, Wie-9, Wilki-1, Wra-2,
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 We-1, Zi-1
 I/A-5, A-6, Bol-2, Bre-7, Bre-8, Bre-9, Gi-3,
 Gi-4, Kell-2, Pfe-1, So-1, Wie-5
 II/All-1, Bear-1, Calv-1, Cod-1, Cur-1, Dic-3,
 Dr-1, Du-1, El-1, Fru-1, Gi-5, Jeu-5, Jo-2,
 Kab-1, Kell-3, Ki-8, Ki-9, Ki-10, Ki-11, Ki-12,
 Lint-1, Mj-1, Mosk-1, Ni-9, Ni-13, Ni-14, Nis-1,
 Or-2, Pea-3, Pea-4, Pr-1, Sc-4, Til-1, Wen-1,
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 II/Nag-4, Pra-2

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 II/Kor-1, Lap-2, Pea-3, Wie-9

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 II/A-8, Bag-1, Cad-1, Chu-1, Gom-1, Gran-2,
 Gran-3, Gran-4, Gran-5, Huo-1, Kell-3, Ma-1,
 Ma-2, Ma-3, Mj-1, Pla-1, St-1, Zar-3

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 II/Huf-1, Mat-1, Sc-2, Sc-3
 Ytterbium: II/Bry-1
 Zink: II/Roe-1

III. Author Index.

Abels, L. L.

Work Completed

Ab-1 Subject: Molecular Transitions

Title: Widths and Strengths of Vibration-
 Rotation Lines in the Fundamental
 Band of Nitric Oxide: L. L. Abels
 and J. H. Shaw.

Journal: J. Mol. Spectr. 20, 11 (1966).

Particulars: 5.3 μ region studied at 300°K.

Alamichel, C.

Work Completed

Ala-1 Subject: Molecular Transitions

Title: Dispersion in the Fundamental Vibration-Rotation Band of NO.

Journal: J. Phys. (Paris) 27, 345 (1966).

Particulars: The square of the pure vibrational
 transition moment was determined as
 well as integrated band intensity
 ($132 \text{ cm}^{-2} \text{ atm}^{-1}$). Some linewidths
 are measured; $\sim 0.12 \text{ cm}^{-1} \text{ atm}^{-1}$. Cal-
 culations of linewidths by Anderson
 theory.

Ali, A.W.K.

Work Completed

Ali-1 Subject: Bound-Bound Transitions

Title: Resonance Broadening of Spectral
 Lines

Report: Univ. Microfilms (Ann Arbor, Mich.),
 Order No. 65-9859; Dissertation
 Abs. 26, 1699 (1965).

Allen, R. A.

Work Completed

All-1 Subject: Bound-Free Transitions, Free-Free Transitions

Title: Measurement of the Free-Bound and
 Free-Free Continua of Nitrogen,
 Oxygen and Air: R. A. Allen,
 A. Textoris, and J. Wilson

Journal: J.Q.S.R.T. 5, 95 (1965).

H. Anton

Work Completed

Ant-1 Subject: Molecular Transitions

- Title: Zur Lumineszenz einiger Moleküllgase bei Anregung durch schnelle Elektronen. II.
- Journal: Ann. Phys. (Leipzig) 18, 178 (1966).
- Particulars: Using 50 kev Electrons, luminescence of N, CO₂, O, Air and N-O mixtures studied at various pressures.
- Antropov, E. T.
- Work Completed
- Antr-1 Subject: Molecular Transitions
- Title: Probability of Electronic-Vibrational Transitions in Diatomic Molecules: F. S. Ortenberg and E. T. Antropov.
- Journal: USP. Fiz Nauk 90, 237 (1966).
- Particulars: Review of Franck-Condon Factors for electronic transitions of diatomic molecules.
- Appleton, John P.
- Work Completed
- Ap-1 Subject: Molecular Transitions
- Title: The Vacuum Ultraviolet Absorption of Shock-Heated Vibrationally Excited Nitrogen.
- Report: G. M. Def. Res. Lab. TR66-01M (July 1966) ARPA Order No. 347, Project Code No. 7400.
- Particulars: Experimental measurements.
 $1086 < \lambda < 1334 \text{ \AA}$; $3000 < T < 10000^\circ \text{K}$.
- Ap-2 Subject: Molecular Transitions
- Title: Vacuum-Ultraviolet Absorption of Shock-Heated Vibrationally Excited Nitrogen: Appleton and Steinberg.
- Journal: J. Chem. Phys. 46, 1521 (1967).
- Particulars: Absorption measurements in shock-heated air using a H discharge lamp as a source.
- Work Planned
- Ap-3 Subject: Molecular Transitions
- Particulars: To extend vacuum ultraviolet measurements in nitrogen to other wavelengths over temp. range $2000 - 10^4 \text{ K}$ and to carry out absorption measurements in O₂ and NO.
- Armstrong, Baxter H.
- Work Completed
- A-8 Subject: Bound-Bound Transitions, Opacity
- Title: The Atomic Line Contribution to the Radiation Absorption Coefficient of Air: B. H. Armstrong, R. R. Johnston, P. S. Kelly.
- Journal: J. Q. S. R. T. 5, 55 (1965).
- Particulars: Contributions of all appropriate states are considered, with progressive lumping at higher levels. Hartree-Fock-Slater radial dipole integrals used with Baranger-Stewart electron collision broadening in a Voigt profile. Hydrogen approximations are made for principal quantum numbers $n \geq 9$ or $l \geq 4$.
- A-9 Subject: Opacity
- Title: Opacity of High Temperature Air: B. H. Armstrong, R. R. Johnston and P. S. Kelly.
- Journal: Progress in High Temperature Physics and Chemistry (to be published).
- Report: AFWL-TR-65-17 (June 1965).
- Particulars: Description of complete opacity calculations carried out at Lockheed and General Atomic 1958-1965. Report also contains computer program.
- Arpigny, Claude
- Work Completed
- Arp-1 Subject: Molecular Transitions
- Title: Detailed Study of the CN Violet (0,0) Band in Cometary Spectra
- Journal: Ann. Astrophys. 27, 393 (1964).
- Arp-2 Subject: Molecular Transitions
- Title: The Rotational and Vibrational Temperatures of C₂ in Comets.
- Journal: Mem. Soc. Roy. Sci. Liège, Collection in 8° 12, 165 (1966).
- Particulars: Swan bands.
- Ashley, E. N. Jr.
- Ash-1 Subject: Opacity
- Title: Radiant Properties of High-Temperature Equilibrium Air (3800-6500°A)

- Report: NASA Accession No. N65-11413, Rept. N. AD 607069. Avail CFST1, (1964).
Particulars: Linear spectral abs. coef. have been computed for air from 1000 to 24000°K and density ratios (ρ/ρ_0) from 1 to 10^{-6} .
- Bagus, P. S.
Work Completed
Bag-1 Subject: Wave Functions
Title: Analytic-Expansion Unrestricted Hartree-Fock Wave Function for the 5D State of Fe: P. S. Bagus and B. Liu.
Journal: Phys.Rev. 148, 79 (1966).
Particulars: An accurate analytic-expansion unrestricted Hartree-Fock wave function is reported for the 5D state of Fe. The computed values of magnetic dipole hyperfine constants are in good agreement with experiment.
- Banks, H. W.
Work Completed
Ban-1 Subject: Bound-Bound Transitions
Title: Analysis of the First Spectrum of Titanium from 2000 Å to 9000 Å. H. W. Banks, W. Bozman and C. M. Wilson.
Report: Georgetown Observ. Monogr. No. 20, 1 (1966).
Particulars: A new description and extended analysis of TiI are presented.
- Barnes, B. T.
Work Completed
Barn-1 Subject: Opacity
Title: Transmittance of Components of Air for λ 1850 Å
Journal: Appl. Opt. 5, 1685 (1966).
Particulars: Transmittance of 1850 Å radiation through air at various relative humidities.
- Bartky, Charlotte Decker
Work Completed
Bar-1 Subject: Scattering
Title: Predicting the Emittance of a Homogeneous Plume Containing Alumina Particles
- Journal: J. Spacecraft Rockets 3, 1523 (1966).
Particulars: Mie scattering calculations.
- Bayer-Helms, Friedrich
Work Completed
Bay-1 Subject: Bound-Bound Transitions
Title: Zur Analyse Von Linienprofilen: Halbweiten von Voigt-Funktionen
Journal: Z. Angew. Phys. 15, 532 (1963).
Particulars: Tables and graphs.
- Bearden, Alan J.
Work Completed
Bear-1 Subject: Bound-Free Transitions
Title: X-Ray Photoeffect Cross-Sections in Low and Medium Z Absorber for Energy Range 852 eV to 40 keV
Journal: J. Appl. Phys. 37, 68 (1966).
Particulars: N,O included.
- Beaty, Earl C.
Work in Progress
Bea-1 Subject: Bound-Free Transitions
Particulars: Photodissociation of He. Code handles the molecular part of the problem. The electronic matrix element must be calculated separately. The electronic matrix element is being calculated at Queen's University, Belfast.
- Becart, M.
Work Completed
Bec-1 Subject: Molecular Transitions
Title: CO Spectrum Obtained with Schueller Lamp. Determination of Molecular Constants, Intensity Distribution in Bands
Journal: J. Phys. (Paris) 26, 231 (1965).
Particulars: CO spectrum in uv measured.
- Bell, K. L.
Work Completed
Bel-1 Subject: Energy Levels, Wave Functions
Title: The Fine Structure of the 2P Terms of the Lithium Isoelectronic Sequence
Journal: Proc. Phys. Soc.(London) 85, 1314 (1965).

- Particulars: Analytic Hartree-Fock functions were used to make ab initio calculations of fine structure separations of certain states.
- Bezzerrides, Bandel
Work Completed
- Bez-1 Subject: Bound-Bound Transitions
Title: Radiation Absorption Phenomena in Gases
Report: AEC Accession No. 19619 Report No. UCRL-16635
Particulars: Greens function techniques are used to develop a general theory of line broadening in gases.
- Bibermann, L. M.
Work Completed
- Bib-1 Subject: Opacity
Title: Optical Properties of Air at 4000 - 10,000°K: L. M. Bibermann and A. Kh. Mnatsakanyan
Journal: Teplofizika Vysokikh Temperatur Akad. Nauk. SSSR 4, 148 (1966). Also English translation: High Temperature 4, 148 (1966).
- Blake, A. J.
Work Completed
- Bl-1 Subject: Molecular Transitions
Title: Photoabsorption Cross Sections of Molecular Oxygen Between 1250 Å and 2350 Å: A. J. Blake, J. H. Carver and G. N. Haddad
Journal: J.Q.S.R.T. 6, 451 (1966).
Particulars: Departures from Beer's Law observed in a number of wavelength regions.
- Bleekrode, R.
Work Completed
- Ble-1 Subject: Molecular Transitions
Title: Absorption and Emission Measurements of C₂ and CH Electronic Bands in Low Pressure Oxyacetylene flames: R. Bleekrode and W. C. Nieuwpoort
Journal: J. Chem. Phys. 43, 3680 (1965).
Particulars: Absorption and emission spectra pertaining to electronic transitions in C₂ and CH were measured in low pressure oxyacetylene flames; P and R branches well resolved.
- Bode, Gerhard
Work Completed
- Bod-1 Subject: Continuous Opacity
Title: Die Kontinuierliche Absorption von Sternatmosphären in Abhängigkeit von Druck, Temperatur und Elementhäufigkeit
Journal: Z. Astrophysik 66, 170 (1967).
Report: Sonderdruck (1965).
- Boldt, G.
Work Completed
- Bol-5 Subject: Bound-Bound Transitions
Title: Measurements of Absorption Oscillator Strengths and Line Broadening in the Wavelength Region from 1000 to 2000 Å
Journal: J.Q.S.R.T. 5, 91 (1965).
- Brandt, Werner
Work Completed
- Bra-3 Subject: Bound-Free Transitions
Title: Atomic Photoabsorption Cross Sections: W. Brandt, L. Eder, and S. Lundqvist
Journal: J.Q.S.R.T. 7, 185 (1967).
Particulars: Collective effects emphasized.
- Bra-4 Subject: Energy Levels
Title: Many-Electron Effects in the Dipolar Spectra of Closed-Shell Atoms: W. Brandt and S. Lundqvist
Journal: Arkiv. Fysik 28, 399 (1965)
Particulars: A comprehensive discussion is given of the qualitative features of the many-electron effects in atomic spectra in various frequency ranges.
- Work in Progress
- Bra-5 Subject: Molecular Transitions
Particulars: Collective effects in molecular excitations.
- Bréchet, S.
Work Completed
- Brec-1 Subject: Bound-Bound Transitions
Title: L'Élargissement des Raies

- Spectrales par Chocs. I.-La Contribution adiabatique. II.-Théorie générale de l'élargissement par chocs électroniques: Sylvia Bréchet et Henri van Regemorter
Journal: Ann. d'Astrophys. 27, 432 and 739 (1964)
Particulars: Lindholm and Baranger theories are modified and a more general theory proposed.
- Brehm, Burkhard
Work in Progress
Breh-1 Subject: Bound-Free Transitions
Particulars: Photodetachment in mass selected negative ion beam with laser light, electron energy analysis.
- Brennen, W.
Work Completed
Bren-1 Subject: Molecular Transitions
Title: Observations on the Yellow Nitrogen Afterglow Band at Low Pressure and the Radiative Lifetimes of the $B^3\Pi_g$ and $A^3\Sigma_u^+$ States of Nitrogen
Journal: J. Chem. Phys. 44, 1793 (1966).
Particulars: $B^3\Pi$ ($v = 11$) $\tau \sim (2.4 \pm .5) \times 10^{-6}$ sec
 $A^3\Sigma$ ($v = 0$) $\tau \sim .12 \pm .24$ sec
- Brogordskii, M. M.
Work Completed
Brog-1 Subject: Molecular Transitions
Title: Spectroscopic Study of Glow Discharges in Air: M. M. Brogordskii and E. H. Eremin
Journal: Zh. Fiz. Khim 40, 2771 (1966).
Particulars: Experimental work systems studied. $N_2(1+)$, $N_2(2+)$ $N_2^+(1-)$, NO- γ .
- Brown, William A.
Work Completed
Brow-1 Subject: Bound-Bound Transitions
Title: Measurement of Pb I Lines
Journal: Phys. Fluids 9, 1273 (1966).
Particulars: f numbers of Pb lines determined by shock tube, at 10,000°; double prism spectrograph with revolving drum camera.
- Bryant, B. W.
Work Completed
Bry-1 Subject: Bound-Bound Transitions
Title: Spectra of Doubly and Triply Ionized Ytterbium Yb III and Yb IV
Journal: J. Opt. Soc. Am. 55, 771 (1965).
Particulars: Emission spectra was photographed from 600-11,000 Å. Main transition arrays of these species were identified.
- Bugrim, E.
Work Completed
Bug-1 Subject: Molecular Transitions
Title: New Bands in the Swan System of the C_2 Molecule: E. D. Bugrim, A. I. Lyutyi, V. S. Rossikhin, and I. L. Tsikora
Journal: Optika i Spektroskopiia 19, 524 (1965). (English Trans. 19, 292 (1965).
Particulars: New measured bands with $\Delta v = +1, +2$.
- Burke, P.
Work Completed
Bur-1 Subject: Scattering
Title: Resonances in Electron Scattering and Photon Absorption
Journal: Advan. Phys. 14, 521 (1965).
Particulars: Survey of theories.
- Cade, Paul E.
Work Completed
Cad-1 Subject: Molecular Transitions
Title: Electronic Structure of Diatomic Molecules. II A Hartree-Fock Wave-Functions and Energy Quantities for $N_2(x^1\Sigma_u^+)$ and $N_2^+(x^2\Sigma_g^+, A^2\Pi_u, B^3\Sigma_u^+)$ molecular ions: P. E. Cade, K. D. Sales, and A. C. Wahl.
Journal: J. Chem. Phys. 44, 1973 (1966).
Particulars: Roothaan method used.
- Cairns, R. Bryan
Work Completed
Cai-1 Subject: Molecular Transitions

- Title: Total Absorption Cross Sections of CO and CO₂ in the Region 550 - 200 Å:
R. B. Cairns and A. Samson
Journal: J. Opt. Soc. Am. 56, 526 (1966).
Particulars: Graphical results $\pm$ 5% 550 - 340 Å
 $\pm$ 10% 340 - 200 Å.
- Callear, A.
Work Completed
Cal-1 Subject: Molecular Transitions
Title: (0,0), (2,0) and (3,0) Bands of the β System of NO: A. Callear and I. Smith
Journal: Trans. Faraday Soc. 61, 1303 (1965).
Particulars: Molecular parameters for $\beta^2\Pi$ state derived.
- Cal-2 Subject: Molecular Transitions
Title: Dependence on the r-Centroid of the Band Intensities of the γ System of Nitric Oxide: A. Callear, M. Pilling, and I. Smith
Journal: Trans. Faraday Soc. 62, 2997 (1966).
Particulars: Measured γ NO bands, exciting by electric discharge and irradiation with Xe arc. Compared Morse, RKR Frank-Condon factor with what they obtained.
- Calvert, James B.
Work Completed
Calv-1 Subject: Molecular Transitions
Title: Three-Dimensional Morse Potential Calculation of Vibrational Energy Transfer. Application to Diatomic Molecules: J. B. Calvert and R. C. Amme
Journal: J. Chem. Phys. 45, 4710 (1966).
Particulars: Vibrational energy transfer problems are discussed with respect to Morse potentials with respect to N₂, O₂ and CO.
- Carpenter, Robert O'B.
Work Completed
Car-1 Subject: Molecular Transitions
Title: Line Strengths and Spectral Emissivities of NO as Functions of Temperature and Amount of Gas: R. O'B. Carpenter and M. A. Franzosa
Journal: J.Q.S.R.T. 5, 465 (1965).
Carter, W. J.
Work Completed
Cart-1 Subject: Bound-Free Transitions
Title: Spectrum of Erbium IV
Report: AEC Accession No. 43175 Rept. No. NP 16301 (1966).
Particulars: Free-ion spectrum of Erbium (truly ionized) has been obtained.
- Chandrasekhar, S.
Work Completed
Cha-2 Subject: Continuous Opacity
Title: On the Continuous Absorption Coefficient of the Negative Hydrogen Ion. IV and V.
Journal: Astrophys. J. 128, 114 and 633 (1958).
- Chang, Tai Yup
Work Completed
Chan-1 Subject: Wave Functions, Molecular Transitions
Title: A Perturbation Theory of Isoelectronic Molecules, Applications to CO Based on N₂: T. Y. Chang and W. B. Brown
Journal: Theoret. Chem. Acta 4, 393 (1966)
English
Particulars: Perturbation calculation, theoretical.
- Ch'en, Shang-Yi
Work Completed
Che-15 Subject: Bound-Bound Transitions
Title: Pressure Effects of Foreign Gases on the Absorption Lines of Cesium I. The Effects of Argon on the First Two Members of Principal Series: S. Y. Ch'en and Robert O. Garrett
Journal: Phys. Rev. 144, 59 (1966).
- Che-16 Subject: Bound-Bound Transitions
Title: Pressure Effects of Foreign Gases on the Absorption Lines of Cesium II. The Effects of Helium on the First Two Members of Principal Series: Robert O. Garrett and S. Y. Ch'en
Journal: Phys. Rev. 144, 66 (1966).
- Che-17 Subject: Bound-Bound Transitions

- Title: Pressure Effects of Foreign Gases on the Absorption Lines of Cesium III.
The Effects of Krypton: S. Y. Ch'en and R. O. Garrett
Journal: Phys. Rev. (submitted)
- Che-18 Subject: Bound-Bound Transitions
Title: Pressure Effects of Foreign Gases on the Absorption Lines of Cesium IV.
The Effects of Neon: S. Y. Ch'en and R. O. Garrett
Journal: Phys. Rev. (submitted)
- Chernenko, L. A.
Work Completed
Cher-1 Subject: Molecular Transitions
Title: The Role of Exciting Collisions of the 2nd Kind in the Radiation of N_2 and CO Molecular Bands in N_2 and Ar and CO and Ar Mixtures in a Slow Discharge
Journal: Izv. Vyssh. Ucheb. Zaved., Fiz. 9, 67 (1966).
Particulars: The increase in the intensity of molecular bands due to collisions of the second kind as a function of the number of metastable atoms of Ar was studied.
- Chiarella, C.
Work Completed
Chia-1 Subject: Bound-Bound Transitions
Title: Evaluation of Voigt Spectral Line Functions: C. Chiarella and R. Reichel
Journal: Mon. Notic. Roy. Astron. Soc. 134, 83 (1966).
Particulars: An elementary routine based on a Maclaurin expansion together with an asymptotic expansion is presented for the rapid computational evaluation of Voigt profiles.
- Childs, William J.
Work Completed
Chi-1 Subject: Bound-Bound Transitions
Title: Electronic g Factors of the Low Levels of Ni I: W. Childs, M. S. Fred and L. S. Goodman
Journal: Phys. Rev. 141, 44 (1966).
Particulars: Measured-atomic beam magnetic resonance technique.
- Chiu, Ying-Nan
Work Completed
Chiu-1 Subject: Molecular Transitions
Title: Quantum Theory of Interference and Polarization of Stark-Zeeman Lines in Molecules.
Journal: J. Chem. Phys. 45, 2969 (1966).
Particulars: Theoretical.
- Cho, Seikichi
Work Completed
Cho-1 Subject: Wave Functions
Title: Analytical-Self-Consistent Field Wave Functions for the $1s^2$ Atomic Configuration: S. Cho and T. Tagaya
Journal: Gunma Daigaku Kiyo Shizen Kagaku 12, 59 (1964).
Particulars: Good for $1 \leq Z \leq 8$.
- Churchill, Dewey R., Jr.
Work Completed
Chu-4 Subject: Opacity
Title: Absorption Coefficients of Heated Air: A Compilation to $24,000^\circ K$: D. R. Churchill, B. H. Armstrong, R. R. Johnston, K. G. Müller
Report: Air Force Weapons Laboratory AFWL-TR-65-132 Vols. I and II, October 1965.
Particulars: Average absorption coefficients for 14 contributing systems to heated air absorption. Spectral detail at 0.1 eV interval, every $1000^\circ K$ and for 8 densities. Computed on a line by line basis using "Sacha" computer programs.
- Chu-5 Subject: Opacity
Title: Absorption Coefficients of Heated Air: A. Tabulation to $24,000^\circ K$: D. R. Churchill, B. H. Armstrong, R. R. Johnston, K. G. Müller
Journal: J.Q.S.R.T. 6, 371 (1966).

Particulars: The above report (AFWL-TR-65-132, Vols. I and II) was rewritten for journal publication. The extensive tables presented in the report were abridged with the aid of a special computer program and the abridged tables are contained in the journal article.

Chu-6 Subject: Opacity
Title: Spectral Absorption in Heated Air:
D. R. Churchill and R. E. Meyerott
Journal: J.Q.S.R.T. 5, 69 (1965).

Work Planned

Chu-7 Subject: Opacity
Particulars: Average transmissions will be calculated based on the new spectral atlas described in the foregoing publications. Line shape will be included and comparison made with available experimental results.

Clough, S. A.

Work Completed

Cl-1 Subject: Molecular Transitions
Title: Pressure-Broadened Wing Contribution to the NO Fundamental Band
Intensity: S. A. Clough, B. Shurin, and F. X. Kneizys.
Journal: J. Chem. Phys. 43, 3410 (1965).

Codling, K.

Work Completed

Cod-1 Subject: Molecular Transitions
Title: New Rydberg Series in Molecular Oxygen Near 500 Å: K. Codling and R. P. Madden
Journal: J. Chem. Phys. 42, 3935 (1965).
Particulars: Previously unknown resonances in the continuous phototization absorption of O₂ were observed in the 500-600 Å region.

Cod-2 Subject: Bound-Free Transitions
Title: Structure in the Photoionization Continuum of N₂ near 500 Å
Journal: Astrophys. J. 143, 552 (1966).

Particulars: Involves transitions to autoionizing electronic states lying at higher energies than so far reported.

Cook, Gilbert R.

Work Completed

Co-1 Subject: Bound-Free Transitions
Title: Absorption by, and Photoionization of, N₂ and O₂ in the 830-1000 Å Range: G. R. Cook, B. K. Ching, and R. A. Becker
Journal: Discussions Faraday Soc. 37, 149 (1962).

Co-2 Subject: Bound-Free Transitions, Molecular Transitions
Title: Photo-Ionization of N₂ in the 734-805 Å region: G. R. Cook and M. Ogawa
Journal: Can. J. Phys. 43, 256 (1965).
Particulars: Measured in absorptions with Hopfield He background.

Co-3 Subject: Bound-Free Transitions, Molecular Transitions
Title: Photoionization and Absorption Coefficient of NO in the 600-950 Å Region: P. Metzger, R. G. Cook, and M. Ogawa
Journal: Can. J. Phys. 45, 203 (1967).
Particulars: Experimental Hopfield He continuum background source used.

Cooper, John

Work Completed

Coo-1 Subject: Bound-Bound Transitions
Title: Broadening of Isolated Lines in the Impact Approximation Using a Density Matrix Formulation
Journal: Rev. Mod. Phys. 39, 167 (1967).
Particulars: Rederivation of Baranger's results, including simple formulae for calculation of line broadening.

Corliss, Charles H.

Work Completed

Cor-1 Subject: Bound-Bound Transitions
Title: Oscillator Strengths for Lines of NiI
Journal: J. Res. Nat'l. Bureau of Stds. 69 A, 87 (1965).

Particulars: Relative intensities and oscillator strengths for 888 lines of Ni I between 2800 and 9900 Å are reduced to an absolute scale.

Cottrell, T. L.

Work Completed

Cot-1 Subject: Molecular Transitions

Title: The Effect of Noble Gases on Vibrational Relaxation in Carbon Dioxide:
T. L. Cottrell and M. A. Day

Journal: Chem. Soc. (London) Spec. Publ. 20,
253 and 255 (1966).

Particulars: Vibrational relaxation time measured for CO₂ was 6.8 μsec. With He, .30 Ne, .12 etc. The short range interactions between CO₂ and the noble gases are probably softer than the combining rules suggest.

Cox, John P.

Work Planned

CoxJ-1 Subject: Opacity

Particulars: Effect of non-unity refractive index on Rosseland mean opacity; straightforward integration, using results of an approximate theory of radiative transfer in dispersive media.

Curcio, J. A.

Work Completed

Cur-1 Subject: Molecular Transitions

Title: Absorption Spectrum of the Lower Atmosphere from 5400 to 8520 Å:
J. A. Curcio, L. F. Drummeter, and
G. L. Knestrick

Journal: Appl. Opt. 3, 1401 (1964).

Curnutte, Basil Jr.

Work Completed

Cu-4 Subject: Electronic Occupation

Title: Experimental Determination of the De-Excitation-Cross Section for the 6³P₁ State of Mercury by Thallium:
B. C. Hudson and B. Curnutte, Jr.

Journal: Phys. Rev. 148, 60 (1966).

Particulars: Measurement of relative intensity of resonance fluorescence of mercury with and without thallium present was used to calculate the quenching

cross section over the temperature range 800 - 900°C.

Dalgarno, A.

Work Completed

Dal-1 Subject: Scattering

Title: Rayleigh Scattering Near an Absorption Line

Journal: J. Opt. Soc. Am. 53, 1223 (1963).

Particulars: Applied to Na, conventional formula for polarization modified.

Dal-2 Subject: Free-Free Transitions

Title: Free-Free Transitions of Electrons in Gases: A. Dalgarno and N. Lane

Journal: Astrophys. J. 145, 623 (1966).

Particulars: Relates experimental elastic scattering cross-sections to bremsstrahlung cross-sections.

Darling, Byron T.

Work Completed

Da-1 Subject: Energy Levels

Title: The Upper Electronic State of the ¹⁶O₃ Molecule: B. T. Darling and C. W. Liu

Journal: J. Mol. Spectrosc. 21, 146 (1966).

Particulars: The configuration of O₃ excited state is predicted.

Davis, S. P.

Work Completed

Dav-1 Subject: Molecular Transitions

Title: The Red System (A²Π_{1/2} - X²Σ⁺) of the CN Molecule: S. P. Davis and J. G. Phillips

Report: Berkeley, Univ. of California Press, Berkeley and Los Angeles 1963.

Day, Richard A.

Work Completed

Day-1 Subject: Bound-Bound Transitions

Title: Measurement of Stark Widths and Shifts of Nitrogen Ion Lines.

Report: AD 617078

Particulars: Shock tube measurement of ion profiles. Half-width of He I line used to determine density. Results agree with recent theoretical study.

Deutsch, Thomas F.

Work Completed

Deu-1 Subject: Molecular Transitions
Title: NO Molecular Laser
Journal: Appl. Phys. Letters 9, 295 (1966).

DeWitt, Hugh E.

Work in Progress

De-2 Subject: Bound-Bound Transitions
Particulars: Work is in progress to give a statistical mechanical derivation of the Holtzmark theory for spectral line broadening and corrections to it.

Dickerman, Philip J.

Work Completed

Dic-1 Subject: Bound-Bound Transitions
Title: Measurement of Relative Transition Probabilities for Some Lines of the Cu I, Al I, and Mo I Spectra: P. J. Dickerman and R. W. Deuel.
Journal: J.Q.S.R.T. 4, 807 (1964).

Dic-2 Subject: Bound-Bound Transitions
Title: Process for Measurement of Self-Absorption of Spectral Lines in Plasmas: P. J. Dickerman and R. Deuel
Journal: Rev. Sci. Instr. 35, 978 (1964).
Particulars: Self absorption of lines in an Ar plasma.

Work in Progress

Dic-3 Subject: Molecular Transitions
Report: IITRI Report No. T6153-1, September 20, 1966
Particulars: This work is concerned with the determination of individual band f-numbers for a set of selected molecular systems. Shock tubes, possibly supplemented by arc techniques, will be used to investigate the NO + O₂ Schumann-Runge system, with the N₂ First Positive system also to be considered if time and effort permit. In addition, a survey of all existing information concerning these bands is presently being conducted.

Dmitriev, V. D.

Work Completed

Dm-1 Subject: Continuous Opacity
Title: Integral Radiant Emissivity of Tungsten at 1200-2800°K: V. D. Dmitriev and G. K. Kaolopov
Journal: Zh. Prikl. Spektroskopii Akad. Nauk Belorussk SSR 3, 72 (1965).
Particulars: The integral emissivity ($\epsilon_{\lambda T}$) of W was calculated by computer using an analytic formula.

Doughty, N. A.

Work Completed

Dou-1 Subject: Bound-Free Transitions
Title: The Bound-Free Absorption Coefficient of the Negative Hydrogen Ion: N. A. Doughty, P. A. Fraser, and R. P. McEachran
Journal: Mon. Not. Roy. Astr. Soc. 132, 255 (1966).
Particulars: Using 1s, 2s, 2p, 3s, 3p + 3d states of atomic hydrogen in Hartree-Fock free-wave expansion and bound functions of Schwartz
Dou-2 Subject: Free-Free Transitions
Title: The Free-Free Absorption Coefficient of the Negative Hydrogen Ion: N. A. Doughty and P. A. Fraser
Journal: Mon. Not. Roy. Astr. Soc. 132, 267 (1966)
Particulars: Allowing for distortion effects using 1s, 2s, and 2p states of atomic hydrogen in Hartree-Fock free-wave expansion.

Douglas, A.

Work Completed

Doug-1 Subject: Molecular Transitions
Title: The Absorption Spectrum at NO₂ in the 3700 Å to 4600 Å Region: A. Douglas and K. Huber
Journal: J. Phys. 43, 74 (1965).

Dowling, Jerome M.

Work Completed

Dow-1 Subject: Bound-Bound Transitions
Title: Far Infrared Interferometry:

- Upper Limit for Line Widths for the
Pure Rotational Band of Carbon Mono-
xide: J. M. Dowling and R. T. Hall
Journal: J. Mol. Spectry. 19, 108 (1966).
Particulars: $\Delta\nu \sim .03$ to $.06 \text{ cm}^{-1}$, at ~ 300 torr
pressure.
- Dow-2 Subject: Molecular Transitions
Title: Pure Rotational Spectrum of Nitric
Oxide: Richard Hall and
J. Dowling
Journal: J. Chem. Phys. 45, 1899 (1966).
- Dressler, K.
Work Completed
Dre-1 Subject: Molecular Transitions
Title: Absolute Transition Probabilities
in the Ultraviolet Spectrum of CO:
J. Hesser and K. Dressler
Journal: Astrophys. J. 142, 389 (1965).
Particulars: $A^1\Pi - X^1\Sigma^+$ transition studied,
 $v' = 0, 1, 2$. Lifetimes obtained.
Also included are data for
 $D^2\Sigma^+ - X^2\Pi$ of NO and $A^1\Pi - X^1\Sigma^-$
of NO^+ .
- Dre-2 Subject: Molecular Transitions
Title: Absorption Spectrum of the NO Mole-
cule, V. Survey of the Excited
States and their Interactions:
K. Dressler and E. Miescher
Journal: Astrophys. J. 144, 1266 (1965).
Particulars: All available spectrums studied,
conclusions drawn from them.
- Druetta, M.
Work Completed
Dr-1 Subject: Molecular Transitions
Title: Determination of $\text{O}_2^+(1-)$ System
Relative Vibrational Transition
Probabilities: M. Druetta and
M. Dufay
Journal: Phys. Lett. 23, 239 (1966).
Particulars: Franck-Condon factors and r-
centroids for this band system
are given.
- C. H. Dugan
Work Completed
Dug-1 Subject: Molecular Transitions
Title: Light from the Collision of Ex-
cited N with NO
Journal: J. Chem. Phys. 45, 87 (1966).
Particulars: Beam of excited N collides with NO
and transitions due to the NO γ
band system are observed.
- Duncan, A. B. F.
Work Completed
Dun-1 Subject: Energy Levels
Title: Theory of Rydberg Terms of the Ni-
trogen Molecule
Journal: J. Chem. Phys. 42, 2453 (1965).
Particulars: Simplified model developed, agrees
well with experiment.
- Dunn, J. L.
Work Completed
Dunn-1 Subject: Energy Levels
Title: Population Inversions in the $B^2\Sigma$
State of N_2^+
Report: NASA Accession No. N65-20819, Rept.
No. AD610094, 12-14. (1965).
Particulars: Perturbation calculation on inter-
action between vibrational level
 $v = 1$ of $B^2\Sigma$ state, $v = 11$ level of
the $A^2\Pi$ state of N_2^+ .
- Durand, J.
Work in Progress
Du-1 Subject: Bound-Bound Transitions
Particulars: Probabilités de Transition C III,
N III, O III.
- Edwards, D. K.
Work Completed
Ed-1 Subject: Molecular Transitions
Title: Absorption of Radiation by Carbon
Monoxide Gas According to the Ex-
ponential Wide Band Model
Journal: Appl. Opt. 4, 1352 (1965).
Particulars: A treatment of the total absorption
to be expected for the $2134 - \text{cm}^{-1}$
band of CO gas, based on a simple
exponential Wide-Band model is

extended to high temperatures.

Ellington, D.

Work Completed

El-1 Subject: Molecular Transitions

Title: The development of a Method for Predicting the Gaseous Radiation Characteristics of Blunt Bodies at Hypersonic Speed: D. Ellington and C. M. Sadowski

Report: NASA Accession No. N64-28015, Contract No. ARPA Order 133, CARDE-TR-504/64 (1964).

Particulars: A method is introduced for calculating nonequilibrium radiation from O_2 S-R and NO β, γ systems based on excitation mechanisms.

Erikson, Gunnar

Work Completed

Er-1 Subject: Bound-Bound Transitions

Title: Oscillation Broadening of Lines from Ionized Elements in Stellar Spectra

Journal: Astrophysica Norvegica 8, 1 (1961).

Erkovich, Agheshin

Work Completed

Erk-1 Subject: Molecular Transitions

Title: Oscillator Strengths for the δ , γ , β Band Systems of NO

Journal: Optika i Spektroskopiya 18 (6) 979 (1965) (Russ).

Particulars: f-numbers calculated from experiments.

Fairbairn, A. R.

Work Completed

Fa-1 Subject: Molecular Transitions

Title: Self-Absorption in Molecular Spectra: Curves of Growth for C_2 and CN

Journal: J.Q.S.R.T. 6, 787 (1966).

Particulars: Line-by-line calculations for C_2 (Swan) and CN (Violet) using Voigt profile.

Fa-2 Subject: Molecular Transitions

Title: A Shock-Tube Study of the Oscillator Strength of the C_2 Swan Bands

Journal: J.Q.S.R.T. 6, 325 (1966).

Particulars: $f_{e1} = 3.3 \pm 1.2 \times 10^{-2}$.

Fano, U.

Work Completed

Fan-1 Subject: Bound-Bound Transitions

Title: Line Profiles in the Far UV Absorption of the Rare Gases: U. Fano and J. Cooper

Journal: Phys. Rev. 137A, 1364 (1965).

Particulars: Profiles of a dozen lines at 20 - 100 eV profile calculations.

Fawcett, B. C.

Work Completed

Faw-1 Subject: Opacity

Title: Helium-like Spectra of Carbon Nitrogen and Neon: B. C. Fawcett and F. E. Irons

Journal: Proc. Phys. Soc. 89, 1063 (1966).

Particulars: Recent observations of He-like spectra of C, N and Ne are discussed.

Faw-2 Subject: Bound-Bound Transitions

Title: Extreme Ultraviolet Spectra from Laser-Produced Plasmas: B. C.

Fawcett, A. H. Gabriel, F. E. Irons, N. J. Peacock, and P. A. Saunders

Journal: Proc. Phys. Soc. (London) 88, 1051 (1966).

Particulars: Line and continuum radiation recorded to 25 Å including Fe XV, XVI and Ni XVII and XVIII.

Ferriso, C. C.

Work Completed

Fer-1 Subject: Molecular Transitions

Title: Prediction of Total Emissivity of Nitrogen Broadened and Self-Broadened Hot Water Vapor: C. B. Ludwig and C. C. Ferriso

Journal: J.Q.S.R.T. 7, 7 (1967).

Particulars: Predictions of total emissivity of N-broadened and self-broadened water vapor at 600 - 3000°K.

Fischer, David W.

Work Completed

Fis-1 Subject: Energy Levels

- Title: Effect of Chemical Combination on the Soft x-ray K Emission Bands of nitrogen and carbon:
D. Fischer and W. Baun
Journal: J. Chem. Phys. 43, 2075 (1965).
Particulars: Wave lengths of bands listed.
- Fishburne, E. Stokes
Work Completed
Fi-1 Subject: Molecular Transitions
Title: Comet-Tail Bands of CO⁺ Photographed Under High Dispersion:
E. S. Fishburne and K. N. Rao
Journal: Mem. Soc. Roy. Sci. Liège, collection in 8° 12, 409 (1966).
- Florance, E. T.
Work Completed
Flo-1 Subject: Opacity
Title: Radio-Frequency Opacity of a Non-uniform Plasma
Journal: J.Q.S.R.T. 5, 271 (1965).
- Fowler, Richard G.
Work Completed
Fo-1 Subject: Molecular Transitions
Title: Lifetimes of H₂, D₂, N₂, CO Transitions: R. G. Fowler and T. M. Holzberlein
Journal: J. Chem. Phys. 45, 1123 (1966).
Particulars: Decay of excitation studies.
- Work in Progress
Fo-2 Subject: Molecular Transitions
Title: Lifetimes of N₂ and NO
Particulars: Decay of excitation studies.
- Fraenkel, B. S.
Work Completed
Fra-1 Subject: Bound-Bound Transitions
Title: Spectroscopy of Highly Ionized Atoms as a Result of Observations by Space Research
Journal: Israel Journal of Technology 4, 106 (1966).
Particulars: Spectral lines at 170-220 Å coincide with laboratory observed lines Fe VIII and Fe IX.
- Freed, K. F.
Work Completed
Fr-1 Subject: Molecular Transitions
Title: Theory of the Hyperfine Structure of Molecular Application to $^3\Pi$ States of Diatomic Molecular Intermediate Between Hund's Cases (a) and (b)
Journal: J. Chem. Phys. 45, 4214 (1966).
Particulars: Fourth-order treatments in order to separate quadrupole interactions of light atoms in molecules from pseudoquadrupole contributions.
- Froese, C.
Work Completed
Fro-1 Subject: Wave Functions
Title: Hartree-Fock Results for Some Excited States of O⁺⁺, O⁺ and Ne⁺
Journal: Phys. Rev. 137A, 1644 (1965).
Particulars: Hartree-Fock wave functions are computed for all the terms for various electronic configurations. The effect of an off-diagonal energy parameter is mainly in the region of the main maximum and the tail of the 3p and 2p wave functions respectively.
- García, José D.
Work Completed
Garc-1 Subject: Energy Levels
Title: Doubly Excited States in Lithium: J. D. García and J. E. Mack
Journal: Phys. Rev. 138A, 987 (1965).
Particulars: Doubly and triply excited states of Li are considered in an effort to identify the energy levels responsible for several narrow lines observed in spectra.
- Garstang, Roy H.
Work Completed
Ga-1 Subject: Bound-Bound Transitions
Title: The Spectrum of Fe XVII
Journal: Pub. Astron. Soc. Pacific Oct. 1966 (in press)
Particulars: Predictions by empirical and quantum

mechanical methods of energy levels and transition probabilities of ultraviolet lines of Fe XVII for use in interpretation of solar corona.

Work in Progress

Ga-2 Subject: Bound-Bound Transitions

Particulars: Calculations by quantum mechanical methods of various transition probabilities for atomic spectra of astrophysical interest.

Gavrila, Mihai

Work Completed

Gav-1 Subject: Bound-Free Transitions

Title: Relativistic K-Shell Photoeffect

Journal: Phys. Rev. 113, 514 (1959)

Particulars: Born approximation for continuum state wavefunctions.

Gav-2 Subject: Bound-Free Transitions

Title: Relativistic L-Shell Photoeffect

Journal: Phys. Rev. 124, 1132 (1961)

Particulars: Born approximation for continuum state wavefunctions.

Gaydon, A. G.

Work Completed

Gay-1 Subject: Bound-Bound Transitions

Title: Temperature Measurements in Shock Tubes: Transition Probabilities for Argon Lines: P. B. Coates and A. G. Gaydon

Journal: Proc. Roy. Soc. (London) A293, 452 (1966).

Gelins, E.

Work Completed

Gel-1 Subject: Bound-Bound Transitions

Title: Research on f Values

Journal: NASA Accession No. N66-15123, Rept. No. ATD-65-86 (1965).

Particulars: Research on oscillator strengths of electron transitions from one energy level to another as shown in the spectral lines of chemical elements published in Soviet literature is abstracted and evaluated.

Generosa, J.

Work in Progress

Gen-1 Subject: Opacity

Particulars: Theoretical calculation of absorption coefficients. Planck and Rosseland mean opacities for air from experimental and theoretical input data.

Gilmore, Forrest R.

Work in Progress

Gi-5 Subject: Electronic Occupation

Particulars: The equilibrium fractional populations of the electronic states of most atomic and diatomic species involving H, C, N, O, and Ar are being calculated from 100 °K up to 10,000,000 °K (for the highly ionized species).

Gi-6 Subject: Energy Levels

Particulars: Potential energy curves for CO and CO⁺ will be drawn by combining published RKR, molecular-orbital, and valence-bond calculations with data from predissociation and electron impact.

Godfredsen, Eugene A.

Work Completed

God-1 Subject: Energy Levels

Title: Atomic Term Energies for Atoms and Ions with 11 to 28 Electrons

Journal: Astrophys. J. 145, 308 (1966).

Particulars: Non-relativistic term energies along isoelectronic sequences.

Golden, Stanley A.

Work Completed

Gold-1 Subject: Molecular Transitions

Title: Approximate Spectral Absorption Coefficients of Electronic Transitions in Diatomic Molecules.

Journal: J.Q.R.S.T. 7, 225 (1967).

Particulars: Smeared line model calculation.

Goldstein, Robert

Work Completed

Go-3 Subject: Molecular Transitions

Title: Absorption Coefficients of the O₂ Schumann-Runge Continuum from 1270 Å ↔ 1745 Å Using a New Continuum Source: R. Goldstein and F. N. Mastrup

- Journal: J. Opt. Soc. Am. 56, 765 (1966).
 Particulars: Experimental measurements using continuum, pulsed light source and photographic techniques.
- Golubev, V. A.
 Work Completed
- Golu-1 Subject: Opacity
 Title: Radiation Capacity of Ar Under High Temperatures and Pressures: V. A. Golubev and Y. N. Ivanov
 Journal: Teplofiz. Vys. Temp 4, 606 (1966). (Russian)
- Gombas, P.
 Work Completed
- Gom-1 Subject: Wave Functions
 Title: Über eine vereinfachte Methode des self-consistent field für Atome
 Journal: Theoret. Chim. Acta 5, 112 (1966).
 Particulars: All 1-electron states of principal quantum number are described by a Slater type function. Orthogonalization is by means of a statistical pseudopotential. Agreement with Hartree Fock is good.
- Goodisman, Jerry
 Work Completed
- Goo-1 Subject: Wave Functions
 Title: Scaling in Carbon Monoxide and Nitrogen.
 Journal: J. Phys. Chem. 70, 1975 (1966).
 Particulars: Scale from one molecule to an iso-electronic molecule.
- Gordon, R. G.
 Work Completed
- Gor-1 Subject: Molecular Transitions
 Title: Semiclassical Theory of Spectra and Relaxation in Molecular Gases
 Journal: J. Chem. Phys. 45, 1649 (1966).
 Particulars: Theory for rotational band contours in microwave, infrared and Raman spectra.
- Grant, Ian P.
 Work Completed
- Gran-2 Subject: Energy Levels, Wave Functions
 Title: Relativistic Self-Consistent Fields
 Journal: Proc. Roy. Soc., A262, 555 (1961).
 Particulars: Theory of many-electron problem in j-j coupling, with tables and formulae for matrix elements of 1- and 2-electron operators between Dirac central-field wave functions.
- Gran-3 Subject: Energy Levels, Wave Functions
 Title: Relativistic Self-Consistent Fields
 Journal: Proc. Phys. Soc. 86, 523 (1965).
 Particulars: Extension of work reported in Proc. Roy. Soc A262, 555 (1961) and correction of some error.
- Gran-4 Subject: Energy Levels, Wave Functions
 Title: The Effect of Relativity on Atomic Wave Functions
 Journal: Article submitted for publication: I. P. Grant and Valerie M. Burke.
 Particulars: Study of systematics of relativistic corrections to hydrogenic wavefunctions as a function of Z, together with a discussion of the possibility of using results to predict corrections for complex atoms.
- Work in Progress
- Gran-5 Subject: Energy Levels, Wave Functions
 Particulars: Program to calculate solutions of the Relativistic Hartree-Fock equations including configuration interaction on I.C.T. Atlas using Hartran.
- Gray, L. D.
 Work Completed:
- Gra-1 Subject: Molecular Transitions
 Title: Relative Intensity Calculations for CO₂: L. D. Gray and J. E. Selvidge
 Journal: J.Q.S.R.T. 5, 291 (1965).
 Particulars: Internal vibrational harmonic-oscillator and rigid-rotator harmonic-oscillator internal partition functions are tabulated for O₂ (150 - 1200°K).

Grechikhin, L. I.

Work Completed

Gre-1 Subject: Bound-Bound Transitions
Title: Measurement of the Coefficients of Absorption of Argon in a Shock Tube: Grechikhin and Nekrashevich
Journal: Vestsi Akad. Navuk Belarusk, Ser. Fiz.-Mat. Navuk p. 91 (1966).
Particulars: The absorption coefficients of Ar in Mach 9 shock tube were detected in the region $\lambda = 4916\text{-}5790 \text{ \AA}$.

Gribov, L.

Work Completed

Grib-1 Subject: Molecular Transitions
Title: Use of Electronic Computers for Calculating Vibrational Spectra: L. Gribov, V. Zhogina, and S. Arkhipova
Journal: Zh. Prikl. Spektrosk. 5, 403 (1966). (Russian)
Particulars: Mainly for polyatomic molecules.

Griem, Hans

Work Completed

Gri-4 Subject: Bound-Bound Transitions
Title: Wing Formulae for Stark Broadened Hydrogen and Hydrogenic Lines
Journal: Astrophys. J. 136, 422 (1962).
Particulars: Asymptotic expressions for Stark profiles are derived from the Fourier integral line-shape formula in terms of the various perturbation matrix elements.

Gri-5 Subject: Bound-Bound Transitions
Title: Theory of Resonance Broadening of Spectral Lines by Atom-Atom Impacts: P. Ali and H. Griem
Journal: Phys. Rev. 140A, 1044 (1965).
Particulars: Dipole-dipole interaction.

Gri-6 Subject: Bound-Bound Transitions
Title: Electron Impact Broadening of Isolated Ion Lines
Journal: Phys. Rev. Letters 17, 509 (1966).
Particulars: Stark widths of spectral lines C II, N II, S II, Ar II, Ca II.

Gusinow, Michael A.

Work in Progress

Gu-1 Subject: Bound-Free Transitions
Particulars: Photodetachment of negative ions with study of energies of detached electrons.

Hallin, Reinhold

Work Completed

Hal-1 Subject: Bound-Bound Transitions
Title: Spectrum of NV
Journal: Arkiv Fysik 31, 511 (1966).
Particulars: The 200-8000 $\text{\AA}$ region has been studied using a θ -pinch discharge.

Hal-2 Subject: Energy Levels

Title: Spectrum of N(IV)

Journal: Arkiv Fysik 32, 201 (1966).

Particulars: Term systems recalculated using experimentally observed spectra.

Hanus, W.

Work Completed

Han-1 Subject: Wave Functions
Title: Influence of Exchange and Polarizability Effects on Relative Line Strengths in Atomic Spectra
Journal: Dull. Acad. Polon. Sci., Ser. Sci., Math., Astron., Phys. 13, 73 (1965).
Particulars: The ratio of the intensities of two components in the principal series in one-valence-electron atoms is partially accounted for by a perturbation calculation involving spin-orbit interactions.

Harrington, J. A.

Work Completed

Har-1 Subject: Molecular Transitions
Title: Shock-Tube Determination with $C_2(A^3\Pi \rightarrow X^3\Pi)$ and $CF(A^2\Sigma^+ \rightarrow X^2\Pi)$ Band System Oscillator Strengths: J. A. Harrington, A. P. Modica, and D. R. Libby
Journal: J. Chem. Phys. 44, 3380 (1966).

Halevi, P.

Work Completed

Hale-1 Subject: Molecular Transitions
Title: An Improved Formula for the Vibrational Transition Probabilities of Diatomic Molecules
Journal: Proc. Phys. Soc. (London) 86
1051 (1965).

Hayakawa, Sachio

Work Completed

Hay-1 Subject: Molecular Transitions
Title: Measurement of the Excitation Cross Section of the N_2^+ (1-) Band by Electron Impact:
S. Hayakawa and H. Nishimura
Journal: J. Geomagnetism Geoelec. (Kyoto) 16, 72 (1964).

Henning, Hinrich

Work Completed

Hen-1 Subject: Bound-Free Transitions, Free-Free Transitions
Title: Die Kontinuierliche Strahlung Thermischer Kohlenstoffplasmen
Journal: Z. Astrophys. 62, 109 (1965).
Particulars: Experimental

Hertzberg, Martin

Work Completed

Her-1 Subject: Bound-Bound Transitions
Title: Transition Coefficient Ratios for Alkali Atoms: M. Hertzberg and R. Holland
Journal: J.Q.S.R.T. 2, 313 (1965).

Herzberg, G.

Work Completed

Herz-1 Subject: Molecular Transitions
Title: The Forbidden $I'\Sigma - X'\Sigma^+$ Absorption Bands of Carbon Monoxide:
G. Herzberg, J. D. Simmons, A. M. Bass, and S. G. Tilford
Journal: Can. J. Phys. 44, 3039 (1966).
Particulars: This forbidden transition has been observed.

Higashino, Ichiro

Work Completed

Hig-1 Subject: Molecular Transitions
Title: Infrared Emission from CO , NO_2 , and CH_4 Gases Excited with High-Frequency Discharge: I. Higashino and M. Hitomi
Journal: Mem. Fac. Eng., Osaka City Univ. 7, 183 (1965).
Particulars: Resolved lines

Hindmarsh, W. R.

Work Completed

Hi-1 Subject: Bound-Bound Transitions
Title: Interpretation of Collision Broadening and Shift in Atomic Spectra: W. R. Hindmarsh, A. D. Petford, and G. Smith
Journal: Proc. Roy. Soc., A297 (1449), 296 (1967).
Particulars: Classical theory of foreign gas broadening was used to evaluate constants in Lennard-Jones potential.

Hofmann, Walter

Work in Progress

Hof-2 Subject: Bound-Bound Transitions
Particulars: Measurement in emission of oscillator strengths of Cl I V-UV-Lines.

Hovenier, Joachim W.

Work Completed

Hov-1 Subject: Free-Free Transitions
Title: X-Ray Spectra Produced by Thermal Bremsstrahlung
Journal: Bull. Astr. Inst. Netherlands 18, 185 (1966).
Particulars: The spectra produced by the thermal Bremsstrahlung of a gas in the wavelength region $2 - 10 \text{ \AA}$ are calculated with accurate gaunt factors for temperatures $5 \times 10^6 - 10^8 \text{ }^\circ\text{K}$.

Huebner, Walter F.

Work Completed

Hue-2 Subject: Opacity
Title: Some Estimates of the Radiative Rosseland Mean Opacity

- Journal: J.Q.S.R.T. to be published (1967)
- Particulars: Approximate calculation of continuous absorption coefficients and mean opacities for pure elements.
- Hue-3 Subject: Bound-Bound Transitions
- Title: Effects of Large Scale Line Splitting on Radiative Absorption
- Report: Los Alamos Report to be published.
- Particulars: Approximate treatment of absorption of lines split by angular momentum coupling for configurations with many partially filled shells.
- Work in Progress
- Hue-4 Subject: Bound-Free Transitions
- Particulars: Relativistic, hydrogenic multipole bound-free Gaunt factors for heavy elements.
- Hue-5 Subject: Opacity
- Particulars: Some estimates of the radiative Planck mean opacity.
- Huffman, Robert E.
- Work Completed
- Huf-1 Subject: Bound-Free Transitions
- Title: Photoionization Study of Diatomic Ion Formation in Argon, Krypton and Xenon: R. E. Huffman and D. H. Katayama
- Journal: J. Chem. Phys. 45, 138 (1966).
- Particulars: Diatomic ions and electrons result from collisions between electronically excited and ground state atoms of Ar, Kr, and Xe.
- Hultberg, Solve
- Work Completed
- Hul-1 Subject: Bound-Free Transitions
- Title: A Study of the Photoelectric Effect and its Application to the Determination of Gamma-Ray Intensities.
- Journal: Arkiv f. Fys. 15, 307 (1959).
- Particulars: Experimental
- Hul-2 Subject: Bound-Free Transitions
- Title: Relativistic Differential and Total K-Shell Photoelectric Cross-Sections and Polarizations: S. Hultberg, B. Nagel, and Per Olsson
- Journal: Arkiv f. Fys. 20, 555 (1959).
- Huo, Winifred M.
- Work Completed
- Huo-1 Subject: Wave Functions
- Title: Electronic Structure of the First Excited State of CO. SCF Wave Function Calculated in the Restricted Hartree-Fock Formalism
- Journal: J. Chem. Phys. 45, 1554 (1966).
- Particulars: A³ state of CO.
- Hurle, I. R.
- Work Completed
- Hurl-1 Subject: Molecular Transitions
- Title: Vibrational Relaxation Processes Under Conditions of Extreme Nonequilibrium
- Journal: Chem Soc (London) Spec. Publ. No. 20, 277 (1966).
- Particulars: Vibrational temperature of relaxing N₂ molecules was measured by line reversal; shock tube method.
- Hylleraas, Egil A.
- Work Completed
- Hy-1 Subject: Energy Levels
- Title: The Negative Hydrogen Ion in Quantum Mechanics and Astrophysics
- Journal: Astrophysica Norvegica 9, 344 (1964).
- Irvine, William M.
- Work Completed
- Irv-1 Subject: Scattering
- Title: The Asymmetry of the Scattering Diagram of a Spherical Particle
- Journal: Bull. Astron. Inst. Netherlands 17, 176 (1964).
- Irv-2 Subject: Scattering
- Title: Light Scattering by Spherical Particles: Radiation Pressure, Asymmetry Factor, and Extinction Cross Section
- Journal: J. Opt. Soc. Am. 55, 16 (1965).
- Jacobs, Theodore A.
- Work Completed
- Jac-1 Subject: Molecular Transitions, Opacity
- Title: Absorption Coefficients of Cl₂

- at High Temperatures: T. A. Jacobs
and R. R. Giedt
Journal: J.Q.S.R.T. 5, 457 (1965).
Particulars: Experimental: $T = 1000^{\circ}\text{K}$ to 2000°K .
- Jacobson, H. C.
Work Completed
Jaco-1 Subject: Bound-Bound Transitions
Title: Pressure Broadening by Noble Gases
Report: Univ. Microfilms (Ann Arbor, Mich.)
Order No. 65-9687; Dissertation
Abst. 26, 2274 (1965).
- Jain, D. C.
Work Completed
Ja-1 Subject: Molecular Transitions
Title: The Effect of the Vibration-Rotation
Interaction on the Franck-Condon
Factors for the Band System of the
Rb H molecule: D. C. Jain and
R. C. Sahni
Journal: Proc. Phys. Soc. (London) 88,
495 (1966).
Particulars: r-centroids computed.
- Ja-2 Subject: Molecular Transitions
Title: Transition Probability Parameters
of the Band Systems of CO^+ :
D. C. Jain and R. C. Sahni
Journal: J.Q.R.S.T. 6, 705 (1966).
Particulars: Frank-Condon factors and r centroids
for Baldet-Johnson, first negative,
comet tail systems calculated using
vibrational wavefunctions of RKR
potential.
- Jansson, R.E.W.
Work Completed
Jan-1 Subject: Molecular Transitions
Title: Relative Transition Probabilities
for the $B^3\Pi \rightarrow A^3\Sigma$ System of
Nitrogen
Journal: Proc. Phys. Soc. (London) 87, 851
(1966).
Particulars: Relative transition probabilities
for $\text{N}_2(1+)$ system were calculated.
- Jenc, F.
Work Completed
Jen-1 Subject: Molecular Transitions
Title: Possible solution of some problems
in molecular spectroscopy
Journal: J. Mol. Spectrosc. 21, 231 (1966).
Particulars: Anomalous behavior explained in
terms of nonadiabatic perturbations.
- Jeunehomme, Michel
Work Completed
Jeu-1 Subject: Molecular Transitions
Title: Lifetime Measurements of Some Ex-
cited States of Nitrogen, Nitric
Oxide and Formaldehyde:
M. Jeunehomme and A.B.F. Duncan
Journal: J. Chem. Phys. 41, 1692 (1964).
- Jeu-2 Subject: Molecular Transitions
Title: Focused Laser-Beam Experiment and
the Oscillator Strength of the
Swan System: M. Jeunehomme and
R. P. Schwenker
Journal: J. Chem. Phys. 42, 2406 (1965).
Particulars: Lifetime of state $A^3\Pi_g$ of C_2 .
- Jeu-3 Subject: Molecular Transitions
Title: Oscillator Strength of the CN Red
System
Journal: J. Chem. Phys. 42, 4086 (1965).
Particulars: Lifetime of state $A^2\Pi$ of CN.
- Jeu-4 Subject: Molecular Transitions
Title: Oscillator Strengths of the First
Negative and Second Positive Systems
of Nitrogen
Journal: J. Chem. Phys. 44, 2672 (1966).
Particulars: Lifetimes of states $C^3\Pi_u$ of N_2 and
 $B^2\Sigma_u^+$ of N_2^+ .
- Jeu-5 Subject: Molecular Transitions
Title: Oscillator Strengths of the Negative
Systems of Oxygen
Journal: J. Chem. Phys. 44, 4253 (1966).
Particulars: Lifetimes of states $A^2\Pi_u$ and $B^4\Sigma_g^-$
of O_2^+ .
- Jeu-6 Subject: Molecular Transitions
Title: Transition Moment of the First Posi-
tive Band System of Nitrogen

Journal: J. Chem. Phys. 45, 1805 (1966).
 Particulars: Lifetime of State $B^3 \Pi_g$ of N_2 .
 Jeu-7 Subject: Molecular Transitions
 Title: Transition Moment Variation in the
 γ System of NO
 Journal: J. Chem. Phys. 45, 4433 (1966).
 Particulars: Lifetime of the state, $A^2 \Sigma^+$ of NO.

Work in Progress

Jeu-8 Subject: Molecular Transitions
 Particulars: Lifetime of a $1 \Pi_g$ of N_2 (Lyman
 Birge Hopfield system).
 Jeu-9 Subject: Molecular Transitions
 Particulars: Lifetime of state $D^3 \Sigma_u^+$ of N_2
 (Fourth Positive system).
 Jeu-10 Subject: Molecular Transitions
 Particulars: Lifetime of state $B^2 \Pi$ of NO
 (β system).

Johansson, Lennart

Work Completed

Joh-1 Subject: Energy Levels
 Title: Spectrum and Term System of the
 Neutral Carbon Atom
 Journal: Arkiv. Fysik 31, 201 (1966).
 Particulars: Spectrum of neutral C has been stu-
 died from 2000 to 30000 Å. Wave-
 lengths for about 450 lines have
 been determined.

John, T. L.

Work Completed

J-4 Subject: Bound-Free Transitions
 Title: Exchange Effects on the Photodetach-
 ment Cross Section of H^-
 Journal: Astrophys. J. 131, 743 (1960).

Johns, J. W.

Work Completed

John-1 Subject: Molecular Transitions
 Title: Absorption of Radiation by Water
 Vapor
 Report: Humidity Moisture Papers, Intern.
 Symp. Washington, D. C. 19631,
 417 (1965).
 Particulars: Microwave, IR, visible and UV ab-
 sorption by water is discussed.

Johnston, Robert R.

Work Completed

Jo-2 Subject: Bound-Free Transitions
 Title: The Photoionization Contribution to
 the Radiation Absorption Coefficient
 of Air: R. R. Johnston, B. H.
 Armstrong and O. R. Platas
 Journal: J.Q.S.R.T. 5, 49 (1965).
 Particulars: Application of Burgess-Seaton
 approximation to continuous opacity
 calculation.

Joshi, K.

Work Completed

Jos-1 Subject: Molecular Transitions
 Title: Forbidden Bands of $A' - X$ System
 of Nitrogen
 Journal: J. Atmospheric Terrest. Phys. 28,
 521 (1966).
 Particulars: r-centroids for system have been
 calculated.
 Jos-2 Subject: Molecular Transitions
 Title: The $C^2 \Sigma_u^+ - X^2 \Sigma_g^+$ System of $^{15}N_2^+$
 Journal: Proc. Phys. Soc. (London) 87,
 561 (1966).
 Particulars: Vibrational constants of C - X sys-
 tem determined by passing condensed
 discharge through $^{15}N_2$ and He.
 Jos-3 Subject: Molecular Transitions
 Title: Absolute Transition Probabilities,
 Oscillator Strengths and Electronic
 Transition Moments for the First
 Negative System of CO^+ : K. Joshi
 V. Sastri, and S. Parthasarathi
 Journal: J.Q.R.S.T. 6, 215 (1966).
 Particulars: $B^2 \Sigma^+ - X^2 \Sigma^+$ System Band oscillating
 strengths from lifetime measure-
 ments.

Jos-4 Subject: Molecular Transitions
 Title: Vibrational Transition Probabilities
 and r-Centroids for the C - X System
 of N_2^+
 Journal: Proc. Phys. Soc. (London) 87, 989
 (1966).
 Particulars: 36 bands observed.

Jos-5 Subject: Molecular Transitions
 Title: Vibrational Transition Probabilities
 of the First Positive System of N_2 :

- K. Joshi, S. Parthasarathi, and
V. Sastri
Journal: J.Q.R.S.T. 6, 205 (1966).
Particulars: Transition probabilities calculated.
- Jos-6 Subject: Molecular Transitions
Title: Electronic Transition Moment Variation of the CN Violet System:
S. Parthasarathi, V. Sastri, and
K. Joshi
Journal: J.Q.R.S.T. 6, 903 (1966).
- Jos-7 Subject: Molecular Transitions
Title: Relative Band Strengths and r-Centroids for the $B' \ ^3\Sigma_u^- - X' \ ^1\Sigma_g^-$ Systems of N_2
Journal: Nature 212, 1459 (1966).
Particulars: Morse potential for both states.
 $v = 0$ to 3 B' and $v = 0$ to 13 X .
- Jos-8 Subject: Molecular Transitions
Title: The Spectrum of the C - X System of N_2^+
Journal: Proc. Phys. Soc. (London) 87, 285 (1966).
Particulars: 2300 - 1300 Å region; experimental.
- Jordan, C.
Work Completed
- Jor-1 Subject: Electronic Occupation
Title: Population of Excited Levels of the Ground Terms of Ions Fe X, XI, and XIV in the Solar Corona
Journal: Phys. Letters 18, 259 (1965).
- Jungen, Ch.
Work Completed
- Jun-1 Subject: Molecular Transitions
Title: Vacuum-Ultraviolet Emission and Absorption Spectrum of the NO Molecule: the $^2\Delta$ States and their Interactions
Journal: Can. J. Phys. 44, 3197 (1966).
Particulars: Vacuum spectrograph investigation of emission spectrum of NO (1600 - 1400 Å). Perturbations are discussed.
- Kabashnikov, V.
Work Completed
- Kab-1 Subject: Molecular Transitions
Title: Effect of Rotation on the Parameters of the Morse Potential Curve for a Molecule: V. Kabashnikov and A. Rubanov
Journal: Dokl. Akad. Nauk. Belorussk SSR. 8, 634 (1964) (Russian).
Particulars: Equations for $D(J)$, $B(J)$ and $r_e(J)$ parameters developed, and quantities tabulated for $J = 0$ to 30 for N_2 , CO, NO, and O_2 . Increasing J increased $r_e(J)$ and decreased $D(J)$.
- Kancerevicius, A.
Work Completed
- Kanc-1 Subject: Bound-Bound Transitions
Title: Calculation of Oscillator Strengths in Atoms by Means of Analytical Functions
Journal: Lietuvus Fiz. Rinkiny, Lietuvus TSR Mokslu Akad., Lietuvus TSR Aukstosios Mokyklos 5, 463 (1965) (Russian).
- Kandel, R.
Work Completed
- Kan-1 Subject: Free-Free Transitions
Title: The Free-Free Absorption of Cl^-
Journal: Annales d'Astrophysique 29, 531 (1966).
- Kaslin, V. M.
Work Completed
- Kas-1 Subject: Molecular Transitions
Title: Rotational Structure of an Ultra Violet Spectrum of Molecular Nitrogen: V. M. Kaslin and G. G. Petrash
Journal: Zh. Eksperim i Teor. Fiz. Pis'ma v Redaktsyu 3, 88 (1966 (Russian)).
- Kegel, Wilhelm H.
Work Completed
- Keg-1 Subject: Scattering
Title: Zur Frage der Beeinflussung des Strahlungstransportes durch Kollektive Effekte
Journal: Z. Astrophys. 61, 232 (1965).

Kelly, Paul S.

Work Completed

Kell-3 Subject: Bound-Bound Transitions

Title: Transition Probabilities in Nitrogen and Oxygen from Hartree-Fock-Slater Wave Functions

Journal: Journal of Quant. Spect. and Rad. Transfer 4, 117 (1964).

Particulars: Radial Integrals for 1600 transitions among 400 excited configurations of N and O and their ions.

Kivel, Bennett

Work Completed

Ki-7 Subject: Opacity

Title: Opacity of Highly Ionized Air: B. Kivel and H. Mayer

Journal: J. Q.S.R.T. 5, 13 (1965).

Particulars: Theoretical calculation of air opacity above 10 eV, similar to Ki-1.

Ki-8 Subject: Free-Free Transitions

Title: Resonances in Neutral Bremsstrahlung

Journal: J.Q.S.R.T. 6, 369 (1966).

Particulars: Resonance effect in neutral Bremsstrahlung is estimated.

Ki-9 Subject: Free-Free Transitions

Title: Relation Between Bremsstrahlung and Elastic Scattering of Low-Energy Electrons: R. L. Taylor and B. Kivel

Ki-10 Subject: Free-Free Transitions

Title: Neutral Atom Bremsstrahlung

Journal: J.Q.S.R.T. 7, 27 (1967).

Particulars: Semi-empirical calculations for the neutral Bremsstrahlung from atomic oxygen and nitrogen are given.

Ki-11 Subject: Free-Free Transitions

Title: Bremsstrahlung in Air

Journal: J.Q.S.R.T. 7, 51 (1967).

Particulars: Estimates of the emissivity and intensity of neutral Bremsstrahlung in air are provided.

Ki-12 Subject: Energy Levels

Title: Excited States of Negative Ions of Atomic Oxygen

Journal: To be published, Physical Review.

Particulars: A discussion of the possibility of

excited states in negative atomic oxygen ions is given.

Klose, Jules Z.

Work Completed

KL-1 Subject: Bound-Bound Transitions

Title: Atomic Lifetimes in Neon I

Journal: Phys. Rev. 141, 181 (1966).

Particulars: Atomic lifetime measurement by method of delayed coincidence.

Work in Progress

KL-2 Subject: Bound-Bound Transitions

Journal: To be submitted to J. Opt. Soc. Am.

Particulars: Conversion of intensities of lines in Neon I tabulated in Am. Inst. of Phys. Handbook to transition probabilities utilizing neon lifetimes published by J. Z. Klose, Phys. Rev. 141, 181 (1966).

KL-3 Subject: Bound-Bound Transitions

Particulars: Measurement of atomic lifetimes in Argon I.

Kopp, Ingvar

Work Completed

Kop-1 Subject: Molecular Transitions

Title: B-X Band System of Ba D: Kopp and Wirhed

Journal: Arkiv. Fysik 32, 307 (1966).

Kop-2 Subject: Molecular Transitions

Title: Rotational Analysis of the A-X Band of Ba H and Ba D: I. Kopp, M. Kronekvist, and A. Guntzsch

Journal: Arkiv. Fysik 32, 371 (1966).

Korchevoi, Y.

Work Completed

Kor-1 Subject: Bound-Bound Transitions

Title: Effective Electron Impact Excitation and Ionization Cross Sections for Cesium, Rubidium and Potassium Atoms in the Subthreshold Region:

Y. Korchevoi and A. Przhonskii

Journal: Zh. Eksp. Teor. Fiz 51, 1617 (1966).

Particulars: The effective cross sections for resonance excitation of Rb atoms (to 5p level) and K atoms (to 4p level) are measured in the subthreshold electron energy region.

Kovacs, I.

Work Completed

Kov-1 Subject: Molecular Transitions
Title: Formulas for Rotational Intensity
Distribution of Triplet Transitions
in Diatomic Molecules
Journal: Astrophys. J. 145, 634 (1966).
Particulars: Tables for various branches of
 $^3\Pi - ^3\Pi$ and $^3\Delta - ^3\Delta$ bands.

Krascella, Nick L.

Work Completed

Kra-1 Subject: Opacity
Title: Theoretical Investigation of Spectral
Opacities of Hydrogen and
Nuclear Fuel
Report: UARL-RTD-TDR-63-1101, Nov. 1963.
Particulars: Bound-free and bound-bound transi-
tions of nuclear fuel; bound-free
and free-free transitions of mole-
cular and atomic hydrogen includ-
ing negative ion, and Lyman α -line.

Kra-2 Subject: Scattering
Title: The Absorption and Scattering of
Radiation by Small Solid Particles
Journal: J.Q.S.R.T. 5, 245 (1965).

Kra-3 Subject: Continuous Opacity, Scattering
Title: Theoretical Investigation of the
Absorption and Scattering Charac-
teristics of Small Particles
Report: UARL-C-910092-1, September 1964
also: NASA-CR-210.
Particulars: Mie theory applied to: C, Al, Si,
Ti, V, Co, Nb, Mo, Rh, Pd, Ta, W,
Re, Ir, Pt.

Kra-4 Subject: Opacity
Title: Theoretical Investigation of the
Opacity of Heavy-Atom Gases
Report: UARL-D-910092-4, September 1965.
Particulars: A theoretical investigation was
conducted to determine the composi-
tion, spectral absorption coeffi-
cients and Rosseland mean opacity
of gaseous nuclear fuel and tung-
sten using a semi-empirical heavy-
atom analytical model in order to
obtain information applicable to

gaseous nuclear rockets. The charac-
teristics of the nuclear fuel were de-
termined for a range of values of each
of the following parameters which must
be assumed in using the heavy-atom
model; ionization potentials, energy
level spacings, total oscillator
strengths, and the ratio of partition
functions for successive ionization
species. Included in these ranges of
values were calculated ionization po-
tentials and partition function ratios.
The greatest changes in Rosseland mean
opacity at a given pressure and tem-
perature resulted from the calculated
changes in fuel ionization potentials.
The Rosseland mean opacity of gaseous
tungsten was calculated on the basis
of completely overlapped lines (which
would result from line broadening due
to the presence of a perturbing gas at
infinite pressure), and for finite-
width spectral lines due to the pres-
ence of specified values of hydrogen
partial pressure.

Kra-5 Subject: Opacity
Title: Theoretical Investigation of the Ab-
sorptive Properties of Small Par-
ticles and Heavy Atom Gases
Report: UARL-910092-7, September 1966.
Particulars: Mie theory applied to Nb, Mo, Cd, Ta
of particle radius 0.01 to 0.50 μ ; and
for W at 1600°K and 4200°K.

Krupenie, Paul H.

Work Completed

Kru-1 Subject: Molecular Transitions
Title: The Band Spectrum of Carbon Monoxide
Report: Natl. Stand. Ref. Data Ser., Natl.
Bur. Stand. (US) NSRDS-NBS No. 2,
87 pp (1966).
Particulars: Exhaustive review.

Kulander, J. L.

Work Completed

Kul-1 Subject: Electronic Occupation
Title: Departures from the Saha Equation

in an Optically Thin Nitrogen Gas.

Journal: J.Q.S.R.T. 5, 253 (1965).

Particulars: The populations of the excited and ionized states in N are calculated for various steady-state non-L.T.E. situations.

Langhoff, P. W.

Work Completed

Lan-1 Subject: Wave Functions.

Title: Electric Dipole Hyperpolarizabilities for S-State Atoms and Ions: P. W. Langhoff, J. D. Lyons, and R. P. Hurst

Journal: Phys. Rev. 148, 18 (1966).

Particulars: Electric dipole hyperpolarizabilities are calculated for 2 to 20 electron S-state atoms and ions, using Hartree-Fock type perturbation procedures.

Lapp, Marshall

Work Completed

Lap-2 Subject: Molecular Transitions

Title: Absorption Cross Sections of Alkali-Vapor Molecules: I. Cs_2 in the Visible, II. K_2 in the Red: M. Lapp and L. P. Harris

Journal: J.Q.S.R.T. 6, 169 (1966).

Particulars: The absorption cross section of Cs_2 varies from about 0.01 to $1.2 \text{ \AA}^2$ over the wavelength range of 4700 to 6700 $\text{\AA}$. The K_2 cross section varies from 5 to $25 \text{ \AA}^2$ for averaged data from 6200 to 6750 $\text{\AA}$.

Lap-3 Subject: Bound-Bound Transitions

Title: Collision Enforced Transitions in Cesium

Journal: Physics Letters 23, 553 (1966).

Particulars: New bands, associated with cesium forbidden quadrupole lines, appear in absorption spectra of cesium with atmospheric pressure of xenon.

Lap-4 Subject: Molecular Transitions

Title: Equilibrium Emissivity Calculations for CO_2 : M. Lapp, L. D. Gray, and S. S. Penner

Conference Proceedings (Book) -

International Developments in Heat Transfer, Part 4 (Am. Soc. Mech. Eng., New York, 1962).

Particulars: Low-temperature spectroscopic data has been used in a statistical model for emissivity calculations to 600°K and correlations to 1800°K .

Work in Progress

Lap-5 Subject: Bound-Bound Transitions

Particulars: The characteristics of collision enforced transitions in cesium are being studied, particularly in their relation to the general features of satellite bands.

Lap-6 Subject: Bound-Bound Transitions

Particulars: Spectral line damping parameters and densities may be determined simultaneously for metal vapors through measurements of total line absorption (equivalent width) and peak line absorption.

Lassette, E. N.

Work Completed

Las-1 Subject: Molecular Transitions

Title: Relative Intensities of Lyman-Birge-Hopfield Bands in Electron Impact Spectrum of Nitrogen:

E. N. Lassette, V. D. Meyer, and M. S. Longmire

Journal: J. Chem. Phys. 42, 807 (1965).

Las-2 Subject: Intensity Distribution in the N

N_2 $k(b \text{ } ^1\Pi_u \leftarrow X^1\Sigma_g^+)$ Transitions:

A. Skerbele and E. N. Lassette

Journal: J. Chem. Phys. 43, 3769 (1965).

Particulars: Theoretical.

Lavercombe, B. J.

Work Completed

Lav-1 Subject: Molecular Transitions

Title: Vibrational Relaxation of CO_2 in Mixtures with Noble Gases

Journal: Nature 211, 63 (1966).

Particulars: Spectrophone measurements of relaxation of the 4.3μ fundamental vibration of CO_2 diluted with rare gases.

Lawley, K.

Work Completed

Lawl-1 Subject: Molecular Transitions

Title: Semiclassical Theory of Rotational
Excitation of a Diatomic Molecule
by an Atom: K. Lawley and J. Ross
Journal: J. Chem. Phys. 43, 2930 (1965).

Lawrence, George M.

Work Completed

Law-1 Subject: Bound-Bound Transitions

Title: Dipole Transition Integrals for Non-
Metal Resonance Transitions
Journal: Astrophys. J. 147, 293 (1966).
Particulars: $p^n - p^{n-1}$.s Extension of Bates-
Damgaard Tables.

Law-2 Subject: Bound-Bound Transitions

Title: Resonance Transition Probabilities
in Intermediate Coupling for some
Neutral Non-Metals
Journal: Astrophys. J. 148, 261 (1967).
Particulars: Neutral Si, Ge, Sn, Pb, P, As, S,
Se, Cl, Br, and I. Transition array
 $p^n - p^{n-1}$.s.

Law-3 Subject: Bound-Bound Transitions

Title: The Absolute Oscillator Strengths
of Lines in the Spectra of 10 Ele-
ments: G. M. Lawrence, J. K. Link,
and R. B. King
Journal: Astrophys. Journal 141, 293 (1965).

Particulars: f-values are reported for 38 lines
in the spectra of neutral Cr, Co, Ni,
Ga, Pd, Ag, In, Sn, Au, and Tl. Ob-
served via atomic beam method.

Law-4 Subject: Molecular Transitions

Title: Lifetimes and Transition Probabili-
ties in CO^+
Journal: J.Q.S.R.T. 5, 359 (1965).

Particulars: The mean lifetime of the $B^2\Sigma$ state
of CO^+ in the levels $v' = 0, 1$ was
determined to be 39.5 ± 4 nsec by
means of phase shift method.

Law-5 Subject: Bound-Bound Transitions

Title: Radiative Lifetimes of Ultraviolet
Multiplets in Boron, Carbon and Ni-
trogen: G. M. Lawrence and B. Savage
Journal: Phys. Rev. 141, 67 (1966).

Lefebvre-Brion, H.

Work Completed

Lef-1 Subject: Energy Levels

Title: Calculation of Rydberg Levels in NO
and BF: H. Lefebvre-Brion and
C. M. Moser

Journal: J. Mol. Spectr. 15, 211 (1965).

Particulars: Non-empirical calculation on NO,
LCAO-MO-SCF orbital used, good
agreement with experiment.

Lef-2 Subject: Energy Levels

Title: Calculation of Rydberg Levels in the
Nitrogen Molecule: H. Lefebvre-Brion
and C. M. Moser

Journal: J. Chem. Phys. 43, 1394 (1965).

Letfus, V.

Work Completed

Let-1 Subject: Bound-Bound Transitions

Title: Measurement of the Absolute Values of
Oscillator Strengths in Atomic Spec-
tra. The Effects of Partial Pressure
and Doppler Broadening.

Journal: Opt. i Spektroskopiya 21, 673 (1966).
(Russian) Also: Optics and Spectros-
copy 21, 371 (1966) (English Transla-
tion)

Particulars: A method is presented for the deter-
mination of f-values by measurement
of broadened lines in Ca, Sr, and Ba.

Liberman, David A.

Work Completed

Li-2 Subject: Bound-Free Transitions

Title: Calculation of the Photo-Electric
Absorption Coefficient by the Sta-
tistical Method: D. A. Liberman
and I. Cherry

Report: IA-3581-MS August 1966.

Particulars: The absorption coefficient for radia-
tion is computed using the statistical
(Thomas-Fermi) method.

Lin, Sheng Hsien

Work Completed

Lin-1 Subject: Molecular Transitions

Title: Calculation of the Lifetime of the
a $^4\Pi$ State of NO

- Journal: J. Chem. Phys. 46, 279 (1967).
 Particulars: Radiative and non-radiative lifetimes calculated using L.C.A.O.M.O. of Brion.
- Linton, C.
 Work Completed
 Lint-1 Subject: Molecular Transitions
 Title: New Identifications in the $O_2(2-)$ System
 Journal: Nature 212, 1358 (1966).
 Particulars: New bands of $A^2\Pi_u - X^2\Pi_g$ transition.
- Ludwig, C. B.
 Work Completed
 Lud-1 Subject: Molecular Transitions
 Title: Spectral Emissivities and Integrated Intensities of the 6.3- μ Fundamental Band of H_2O : C. B. Ludwig, C. C. Ferriso, and C. N. Abeyta
 Journal: J.Q.S.R.T. 5, 281 (1965).
 Lud-2 Subject: Molecular Transitions
 Title: High-Temperature Spectra of the Pure Rotational Band of H_2O : C. B. Ludwig, C. C. Ferriso, W. Mallam, and F. P. Boynton
 Journal: J.Q.S.R.T. 5, 697 (1965).
 Lud-3 Subject: Molecular Transitions
 Title: Empirically Determined Infrared Absorption Coefficients of H_2O from 300 to 3000 $^{\circ}K$: C. C. Ferriso, C. B. Ludwig, and A. L. Thomson
 Journal: J.Q.S.R.T. 6, 241 (1966).
- Lüscher, Edgar
 Work Completed
 Lue-1 Subject: Scattering
 Title: Compton-Effect Calculations for Astrophysical Applications: William E. Baylis, Wolfgang M. Schmid and Edgar Lüscher
 Journal: Z. Astrophys. 66, 271 (1967).
- Lutz, Michael A.
 Work Completed
- Lu-1 Subject: Bound-Free Transitions
 Title: Radiant Energy Loss from a Cesium-Argon Plasma to an Infinite Plane Parallel Enclosure (MHD)
 Report: Research Report No. 175, Sept. 1963 (Avco-Everett Research Labs)
 Particulars: Numerical integration of line profiles. MHD radiative losses primarily due to lines.
- Lu-2 Subject: Bound Free Transitions
 Title: Radiation and its Effect on the Non-Equilibrium Properties of a Seeded Plasma
 Thesis: Ph.D. M.I.T. Library, Sept. 1965
 Particulars: Numerical calculation of effect of line radiation losses on electron temperature in M.H.D. channel.
- Main, Roger P.
 Work Completed
 Mai-1 Subject: Opacity
 Title: Opacities of Carbon-Air Mixture at Temperatures from 3000 - 10,000 $^{\circ}K$: Roger P. Main and Ernest Bauer
 Journal: J.Q.S.R.T. 6, 1 (1966).
 Particulars: Computer calculations of spectral absorption coefficients and opacities for equilibrium mixtures, including molecular band systems, some continua, and the effect of carbon particles.
- Mai-2 Subject: Opacity
 Title: Equilibrium Opacities and Emissivities of Hydrocarbon-Air Mixtures at High Temperatures: R. P. Main, E. Bauer, and S. Katz
 Report: Aeronutronic Division of Philco Corp. Report U-3304, October, 1965.
 Particulars: CH_2 - air equilibrium mixtures for temperatures of 3000 - 7500 $^{\circ}K$, pressures of 10^{-2} to 10^2 atm., including the effects of carbon particles. Spectral emission for ethylene-air flame gases.
- Mai-3 Subject: Molecular Transitions
 Title: Oscillator Strength Measurements for Transitions in the MgO and MgH Molecules: R. P. Main and D. J. Carlson

- Journal: J.Q.S.R.T., to be published.
- Particulars: Experimental measurements of absolute spectral emission intensities from rocket motor combustion chambers into which a MgO-water slurry has been injected yield system f-values for MgO and MgH transitions near 5000 Å. Number densities and excited state populations have been calculated by computer for the equilibrium conditions in the chamber.
- Work in Progress
- Mai-4 Subject: Opacity
- Particulars: Computer calculations of spectral absorption coefficients and opacities of Teflon-air equilibrium mixtures at temperatures from 3000-7500°K and pressures from 10^{-2} -10 atm., including the effects of carbon particles.
- Mai-5 Subject: Molecular Transitions
- Particulars: A comprehensive and critical bibliography and data source on probabilities, and related quantities, of molecular electronic transitions of interest in astrophysics and aerophysics.
- Malli, Gulzari L.
- Work Completed
- Ma-1 Subject: Wave Functions
- Title: Vector Coupling Coefficients for Atomic Self-Consistent Field Calculations: G. L. Malli and J. P. Olive
- Journal: J. Chem. Phys. 43, 861 (1963).
- Particulars: Tables are given
- Ma-2 Subject: Wave Functions
- Title: Physical Properties of Many Electron Atomic Systems Evaluated from Analytical Hartree-Fock Functions. I Nuclear Magnetic Shielding Constants: G. L. Malli and S. Fraga
- Journal: Theoret. Chim. Acta 2, 275 (1966).
- Particulars: Nuclear magnetic shielding constants have been calculated for all neutrals and ions up to Z = 36.
- Ma-3 Subject: Wave Functions
- Title: Accurate Analytical Self-Consistent-Field Hartree-Fock Wave Functions for Second-Row Atoms
- Journal: Can. J. Phys. 44, 3121 (1966).
- Particulars: Analytic wave functions are calculated for 2nd row-atoms in ground and lowest excited states.
- Malone, B. S.
- Work Completed
- Mal-1 Subject: Bound-Bound Transitions
- Title: Transition Probability Measurement in the Blue-Near-UV Spectrum of ArI: B. S. Malone and W. E. Corcoran
- Journal: J.Q.S.R.T. 6, 443 (1966).
- Particulars: Several Ar I lines observed in L.T.E. from which transition probabilities were determined.
- Marquet, L. C.
- Work Completed
- Marq-1 Subject: Bound-Bound Transitions
- Title: The Atomic Spectra of Er I and ER II
- Report: Univ. Microfilms (Ann Arbor, Mich.) Order No. 64-9053 Dissertation Abst. 25, 4761 (1965).
- Marrus, R.
- Work Completed
- Marr-1 Subject: Bound-Bound Transitions
- Atomic Beam Study of the Stark Effect in the Cesium and Rubidium D lines: R. Marrus, D. McColm, and J. Yellin
- Journal: Phys. Rev. 147, 55 (1966).
- Marteney, P. J.
- Work Completed
- Mart-1 Subject: Opacity
- Title: Theoretical and Experiment Investigations of Spectral Opacities of Mixtures of Hydrogen and Diatomic Gases: P. J. Martency and N. L. Krascella
- Report: UARL-RTD-TDR-63-1102, Nov. 1963.
- Particulars: Theoretical program: CO, BeO, CN. Experimental program: CO, HCL, CH₄, 1000°K to 3100°K, 8 to 68 atm.
- Mart-2 Subject: Scattering, Opacity
- Title: Experimental Investigation of the Opacity of Small Particles
- Report: UARL-C-910092-2, Sept. 1964.
- Particulars: Extinction of C, W particles of radii

- between 0.0045 and 0.01 μ .
- Mart-3 Subject: Scattering, Opacity
 Title: Experimental Refractive Indices and Theoretical Small-Particle Spectral Properties of Selected Materials: P. J. Marteney, N. L. Krascella, and W. G. Burwell.
 Report: UARL-D-910092-6, Sept. 1965.
 Particulars: The complex refractive indices of Hf, Mo, Ni, and W in the wavelength range between 0.2 and 0.7 μ have been measured. Spectral absorption, scattering, and extinction have been calculated from Mie theory for small spherical particles of 9 metals, using the values of the complex refractive indices of the above 4 metals. The complex refractive indices for Co, Fe, Ti, Va, and Zr were taken from the current literature. The Rosseland mean opacity of the 0.54 μ -radius W particles was also determined.
- Matese, John J.
 Work Completed
 Mate-1 Subject: Bound-Free Transitions
 Title: Influence of Screening on the Atomic Photoeffect: J. J. Matese and W. Johnson
 Journal: Phys. Rev. 140A, 1 (1965).
 Particulars: Photoionization from screened Coulomb field.
- Matsunaga, Frederick M.
 Work Completed
 Mat-1 Subject: Bound-Free Transitions
 Title: Photoionization Yield and Absorption Coefficient of Xenon in the Region of 860 - 1022 $\text{\AA}$: F. M. Matsunaga, R. S. Jackson, and K. Watanabe
 Journal: J.Q.S.R.T. 2, 329 (1965).
- Matsushima, S.
 Work Completed
 Mats-1 Subject: Continuous Opacity
 Title: H_2^+ Absorption as a Source of Continuous Opacity in the Stellar Atmospheres
 Report: Smithsonian Special Report 167, 42 (1964).
 Mats-2 Subject: Opacity
 Title: Effect of Errors in the Absorption Coefficient on the Non-Gray Model Stellar Atmospheres: S. Matsushima and Y. Terashita
 Journal: Astrophys. J. 140, 285 (1964).
- Mayer, Harris L.
 Work Completed
 May-2 Subject: Opacity
 Title: Opacity of Nitrogen by Hand Calculation
 Journal: J.Q.S.R.T. 2, 39 (1965).
- McFarlane, R. A.
 Work Completed
 McF-1 Subject: Molecular Transitions
 Title: Observation of a $^1\Pi - ^1\Sigma$ Transition in the N_2 Molecule
 Journal: Phys. Rev. 140A, 1070 (1965).
 McF-2 Subject: Molecular Transitions
 Title: Precision Spectroscopy of New Infrared Emission Systems of Molecular Nitrogen
 Journal: J. Quantum Electron. 2, 229 (1966).
 McF-3 Subject: Molecular Transitions
 Title: Measurements on the $w^1\Delta_u \rightarrow a^1\Pi_g$ Transition in Molecular Nitrogen
 Journal: Phys. Rev. 146, 37 (1966).
 Particulars: New emission system near 3.65 μ .
- McTavish, Charles J.
 Work Completed
 McT-1 Subject: Opacity
 Title: Predictions of Thermal Damage in Nuclear Fireballs Vol. II. Material Properties
 Report: AFFDL-TR-66-45, Vol. II. June 1966.
 Particulars: Calculations of the equilibrium concentrations and absorption cross sections of molecular species in low temperature vapor were performed for carbon, carbon phenolic, and phenolic. A program, which calculates the total radiation absorption coefficient is described.

Meyer, Claude

Work Completed

Meye-1 Subject: Molecular Transitions

Title: Spectre de vibration-rotation de L'oxyde nitrique NO. Etude de la bande $\nu_{O \rightarrow 4}$ à 7336 cm^{-1} : C. Meyer and C. Haeusler

Journal: Compt. Rend. 260, 4182 (1965)

Particulars: The two sub-bands of the 2Π NO state have been investigated, and line centers assigned. Rotational constants are given.

Meye-2 Subject: Molecular Transitions

Title: Molecular Constants of Nitric Oxide, NO. Infrared Absorption Bands, ν_{O-2} and ν_{O-4} : C. Meyer, C. Haeusler, and P. Barchewitz

Journal: J. Phys. (Paris) 26, 799 (1965) (French)

Meye-3 Subject: Molecular Transitions

Title: Intensities and Vibration-Rotation Line Widths of Diatomic Molecules

Journal: J. Phys. (Paris) 26, 305 (1965).

Particulars: Measurements made on widths of vibrot lines of NO and HI. Results show that Anderson theory is inadequate when applied to molecules with low permanent dipole moment.

Miescher, E.

Work Completed

Mies-1 Subject: Molecular Transitions

Title: Absorption Spectrum of the NO Molecule. Part VII. Extension of the Rydberg Series of ns, np, nd and nf... Complexes.

Journal: J. Mol. Spectry. 20, 130 (1966).

Particulars: Absorption of four different isotopes of NO.

Mies-2 Subject: Molecular Transitions

Title: Absorption Spectrum of the NO Molecule. VI Band Structure below $1600 \text{ \AA}$. Rydberg States $c^2\Pi$, $d^2\Sigma^+$, $k^2\Pi$, $m^2\Sigma^+$, $s^2\Sigma^+$, non Rydberg Series $B^2\Pi$, $L^2\Pi$ and their Interactions: A. Lagerqvist and E. Miescher

Journal: Can. J. Phys. 44, 1525 (1966).

Milford, S. N.

Work Planned

Mil-2 Subject: Scattering

Particulars: Calculation of Photoionization cross-sections for planetary gases.

Miller, R. E.

Work Completed

Mil-1 Subject: Molecular Transitions

Title: High-Resolution Emission Vegard-Kaplan Bands of Nitrogen

Journal: J. Chem. Phys. 43, 1695 (1965).

Particulars: Good resolution, molecular constants obtained.

Mil-2 Subject: Molecular Transitions

Title: High Resolution Emission Vegard-Kaplan Bands and Absolute Energy of the $A^3\Sigma_u^+$ State of Nitrogen

Report: Univ. Microfilms (Ann Arbor, Mich.) Order No. 66-4962; Dissertation Abstr. 26 12, 7377-8 (1966).

Mil-3 Subject: Energy Levels, Molecular Transitions

Title: The Absolute Energy of the $A^3\Sigma_u^+$ State of Nitrogen

Journal: J. Mol. Spectry. 19, 185 (1966).

Milne, E. L.

Work Completed

Miln-1 Subject: Molecular Transitions

Title: Vibraluminescence of CO_2 , N_2O and CO in Active Nitrogen: E. L. Milne and S. L. Dunn

Report: NASA Accession No. N65-20820 Rept. No. AD 610094 15-17 (1965).

Particulars: CO_2 , N_2O or CO added to active N results in near i.r emission corresponding to the vibrational fundamentals of these (added) molecules.

Mitchell, G.

Work Completed

Mit-1 Subject: Bound-Free Transitions

Title: Approximations for the Interpretations of X-Ray K Absorption Spectra

Journal: Dev. Appl. Spectry. 4, 109 (1965).

Particulars: X-ray absorption edges rely on approximations that aren't always justifiable.

Mjolsness, Raymond C.

Work Completed

Mj-1 Subject: Free-Free Transitions

Title: Bremsstrahlung Emission from Low-Energy Electrons on Atoms:

M. C. Mjolsness and H. M. Ruppel

Journal: Phys. Rev. 154, 98 (1967); also as Los Alamos Report LA-DC-7713.

Particulars: A Hartree-Fock theory, using a polarization potential, is developed. Results are applied to oxygen and nitrogen.

Mj-2 Subject: Continuous Opacity

Title: Contribution of Inverse Neutral Bremsstrahlung to the Absorption Coefficient of Heated Air;

M. C. Mjolsness and H. M. Ruppel

Journal: Submitted to J.Q.S.R.T.

Particulars: Bremsstrahlung emission cross sections are used to calculate the linear spectral absorption coefficient.

Work in Progress

Mj-3 Subject: Free-Free Transitions

Particulars: Hartree-Fock theory is applied to the calculation of Bremsstrahlung emission from electron-atom collisions of H, He, and C.

Moise, N. L.

Work Completed

Moi-1 Subject: Bound-Bound Transitions

Title: Absorption Technique for Measurement of Absolute Rates of Atomic Transitions

Journal: Astrophys. J. 144, 763 (1966).

Particulars: A curve of growth is combined with known vapor pressure data to determine absolute transition rates of resonance lines.

Moore, Charlotte E. (Mrs. Sitterly)

Work Completed

Mo-1 Subject: Energy Levels

Title: Term Designations for Excitation Potentials

Report: Princeton University 1934

Mo-2 Subject: Energy Levels

Multiplet Table of Astrophysical Interest

Report: Princeton University Observatory
No. 20 (1945).

Particulars: 2 parts.

Mo-3 Subject: Energy Levels, Bound-Bound Transitions

Title: Ultraviolet Multiplet Tables

Report: N.B.S. Circular 488

Mo-4 Subject: Energy Levels

Title: Atomic Energy Levels as Derived from the Analyses of Optical Spectra

Report: N.B.S. Circular 467, Vol. 1 (1949)
Vol. 2 (1953) Vol. 3 (1958).

Mo-5 Subject: Energy Levels

Title: Selected Tables of Atomic Spectra; Atomic Energy Levels and Multiplet Tables Si II, Si III, Si IV.

Report: NSRDS-NBS 3, Section 1, 1965.

Particulars: Data derived from the analyses of optical spectra.

Mo-6 Subject: Energy Levels

Title: Annual Report from the National Bureau of Standards

Journal: Astron. J. 71, 796 (1966).

Moskvin, Yu. Y.

Work Completed

Mosk-1 Subject: Bound-Free Transitions

Title: Analytical Wave Functions and Photoionization Cross Sections of Negative Ions Having an Outer 2p Electron Shell

Journal: Optika i Spektroskopiia 17, 499 (1964) (Russian). Also: Optics and Spectroscopy 17, 270 (1964) English Translation).

Particulars: N⁻, O⁻, C⁻, F⁻.

Müller, Karl Gerhard

Work Completed

Mu-1 Subject: Bound-Bound Transitions

Title: Influence of Field Inhomogeneity on Ionic Line Broadening

Journal: J.Q.S.R.T. 5, 403 (1965).

Mulliken, Robert S.

Work Completed

Mul-1 Subject: Energy Levels, Molecular Transitions

Title: ³Π Levels and Predissociations of N₂ Near the 12.135 eV Dissociation Limit: P. Carroll and R. S. Mulliken

- Journal: J. Chem. Phys. 43, 2170 (1965).
Particulars: Predissociations in second positive bands examined.
- Naberukhin, Y. I.
Work Completed
Nab-1 Subject: Bound-Bound Transitions
Title: Adiabatic Theory of the Shape of Spectral Lines in Gases, in Terms of the Rigid Sphere Model: A. I. Burshtein and Y. I. Naberukhin
Journal: Optika i Spektroskopiya 20, 936 (1966).
Particulars: Impact theory of line shape extended to high temperature region of weak interactions enabling more precise line wing calculations.
- Nagel, Bengt C. H.
Work Completed
Nag-1 Subject: Wave Functions
Title: Some Topics in Coulomb Scattering
Journal: Trans. Roy. Inst. Tech., Stockholm No. 157 (1960).
Particulars: Relativistic Wave functions.
- Nag-2 Subject: Bound-Free Transitions
Title: On the Relativistic Photoeffect in the K-Shell
Journal: Arkiv f. Fys. 18, 1 (1960).
Particulars: Relativistic multipole cross sections.
- Nag-3 Subject: The Relativistic Photoeffect at the K-Shell Threshold
Journal: Arkiv f. Fys. 18, 29 (1960): Bengt C. H. Nagel and Per O. M. Olsson
Particulars: Cross sections for U.
- Nag-4 Subject: Bound-Free Transitions
Title: Angular Distribution and Polarization of K-Shell Photoelectrons in the High Energy Limit
Journal: Arkiv f. Fys. 24, 151 (1963).
- Nag-5 Subject: Bound-Free Transitions
Title: The Saddle Point Method for Multiple Integrals, with an Application to the Evaluation of Radial Coulomb Matrix Elements for Large Multipole Order
Journal: Arkiv f. Fys. 27, 181 (1964).
- Nakayama, T.
Work Completed
Nak-1 Subject: Bound-Bound Transitions
Title: Two Quantum Statistical Treatments of Spectral Line Shapes Emitted from Plasmas: T. Nakayama and H. E. DeWitt
Report: AEC Accession No. 36721, Rept. N. AD 603003. Avail CFST1 (1964).
Particulars: Results yielded a line width which agreed with a more general form given by Baranger, except for a seemingly negligible contribution.
- Narasimham, N. A.
Work Completed
Nar-1 Subject: Molecular Transitions
Title: $2\Sigma^- \rightarrow X^2\Pi$ Band System of PO Molecule: N. A. Narashimham, M. N. Dixit and V. Sethuraman
Journal: Proc. Indian Acad. Sci. A 62, 314 (1965).
- Nerem, Robert M.
Work Completed
Ner-1 Subject: Bound-Bound Transitions
Title: Atomic Line Radiation in Equilibrium Air
Journal: Am. Inst. Aeron. Astronaut. J. 4, 1485 (1966).
Particulars: Shock tube emission measurements.
- Nesbet, R.
Work Completed
Nes-1 Subject: Molecular Transitions
Title: Valence Excited States of N_2 , CO, and BF
Journal: J. Chem. Phys. 43, 4403 (1965).
Particulars: Calculated from Hartree-Fock functions.
- Nicholls, R. W.
Work Completed
Ni-6 Subject: Molecular Transitions
Title: The Interpolation of Frank-Condon Factor Arrays for Molecular Band Systems
Journal: J.Q.S.R.T. 5, 647 (1965).
Ni-7 Subject: Molecular Transitions
Title: Absolute Band Strengths for the C_2 Swan System
Journal: Proc. Phys. Soc. (London) 86, 873 (1965).

Ni-8 Subject: Molecular Transitions
 Title: Franck-Condon Factors for the Gaydon-Green Band System of N_2
 Journal: J. Chem. Phys. 42, 804 (1965).
 Particulars: $v' \leq 4$, $v'' \leq 5$, Morse potential used.

Ni-9 Subject: Molecular Transitions
 Title: Franck-Condon Factors to High Vibrational Quantum Numbers V: O_2 Band Systems
 Journal: J. Res. Natl. Bur. Std. 69 A, 369 (1965).
 Particulars: S-R band systems not included.

Ni-10 Subject: Molecular Transitions
 Title: Franck-Condon Factors to High Quantum Numbers VI: C_2 Band Systems
 Journal: J. Res. Natl. Bur. Std. 69 A, 397 (1965).

Ni-11 Subject: Molecular Transitions
 Title: r Centroids and the Franck-Condon Principle
 Journal: Proc. Phys. Soc. (London) 89, 181 (1966).

Ni-12 Subject: Molecular Transitions
 Title: Intensity Distribution of the Lyman-Birge-Hopfield Band System of N_2 : D. McEwen and R. W. Nicholls
 Journal: Nature 209, 902 (1966).
 Particulars: Relative intensities of 50 major bands determined. Franck-Condon factors given.

Ni-13 Subject: Molecular Transitions
 Title: Intensity Measurements in the Laboratory on the O_2 Herzberg I ($A^3 \Sigma_u^+ - X^3 \Sigma_g^-$) Band System in an Oxygen-Argon Afterglow
 Journal: J. Geophys. Res. 71, 3781 (1966).
 Particulars: Electronic transition moment is constant and represented by $R_e(r) = \text{cons.} (1 - 0.46)$ when r = internuclear separation.

Ni-14 Subject: Molecular Transitions
 Title: A Theoretical Study of the $v'' = 0, 1, 2$ Progressions of the Bands and Adjoining Photodissociation Continua of the O_2 Herzberg I system: W. R. Jarman and R. W. Nicholls

Journal: Proc. Phys. Soc. (London) 90, 545 (1967).

Particulars: Franck-Condon factors from Klein-Dunham potentials.

Nishimura, Hiroyuki

Work Completed

Nis-1 Subject: Molecular Transitions
 Title: Measurement of the $O_2^+(1-)$ Bands by Electron Impact
 Journal: J. Phys. Soc. Japan 21, 1018 (1966)
 Particulars: Relative line intensities of vibrational band heads of bombarded O_2 are presented.

Norcross, D. W.

Work Completed

Nor-1 Subject: Bound-Free Transitions
 Title: Radiative Recombination in Cesium: D. W. Norcross and P. M. Stone
 Journal: J.Q.S.R.T. 6, 277 (1966).

Ohmura, Takashi

Work in Progress

Oh-3 Subject: Bound-Free Transitions
 Particulars: H^- bound-free
 Oh-4 Subject: Free-Free Transitions
 Particulars: H^- free-free

Work Planned

Oh-5 Subject: Free-Free Transitions
 Particulars: He^- free-free

Öhrn, Yngve

Work Completed

Öhr-1 Subject: Wave Functions
 Title: Correlated Wave Functions for Three Electron Ions: Y. Öhrn and J. Nordling
 Journal: Arkiv Fysik. 31, 471 (1966).
 Particulars: Wave functions for Be II, B III, C IV, N V, O VI.

Olsson, Per O. M.

Work Completed

Ols-1 Subject: Bound-Free Transitions
 Title: A Theoretical Study of the Internal Conversion with Special Application

- to magnetic dipole transitions:
 Per O. M. Olsson, Solve Hultberg
 Journal: Ark. Fys. 15, 361 (1959).
- Ols-2 Subject: Bound-Free Transitions, Free-Free
 Transitions, Bound-Bound Transitions
 Title: On Coulomb Wave Functions
 Journal: Ark. Fys. 15, 131 (1959).
 Particulars: Relativistic Coulomb matrix elements.
- Ols-3 Subject: Bound-Free Transitions, Free-Free
 Transitions, Bound-Bound Transitions
 Title: On Transition Matrix Elements Between
 States in a Coulomb Field I and II
 Journal: Ark. Fys. 15, 159 (1959).
 Ark. Fys. 15, 289 (1959).
- Ols-4 Subject: Bound-Free Transitions, Free-Free
 Transitions, Bound-Bound Transitions
 Title: Laplace Transform of a Product of
 Two Whittaker Functions
 Journal: Ark. Fys. 28, 113 (1965).
 Particulars: Matrix elements of multipole type of
 Coulomb-Dirac wave functions are de-
 rived and continued analytically in
 terms of double hypergeometric
 functions.
- Ols-5 Subject: Bound-Free Transitions, Free-Free
 Transitions, Bound-Bound Transitions
 Title: A Hypergeometric Function of Two Var-
 iables of Importance in Perturbation
 Theory I and II
 Journal: Ark. Fys. 29, 459 (1965).
 Ark. Fys. 30, 187 (1965).
 Particulars: Matrix elements of multipole type of
 Coulomb-Dirac wave functions are de-
 rived and continued analytically in
 terms of double hypergeometric
 functions.
- Work in Progress
- Ols-6 Subject: Bound-Free Transitions, Free-Free
 Transitions, Bound-Bound Transitions
 Journal: To be published in J. Math. Phys. 1967
- Ory, Horace A.
 Work Completed
- Or-1 Subject: Molecular Transitions
 Title: Franck-Condon Factors for the β and γ
 Band Systems of NO: H. A. Ory,
 A. P. Gittleman, and J. P. Maddox
 Journal: Astrophysical J. 139, 346 (1964).
 Particulars: Calculated using Morse wave functions.
- Or-2 Subject: Molecular Transitions
 Title: Unusual Variations in the Frank-
 Condon Factors for the Schumann-Runge
 Band System of O_2 : H. A. Ory and
 A. P. Gittleman
 Journal: Astrophys. J. 139, 357 (1964).
- Parkinson, William H.
 Work in Progress
- Par-1 Subject: Continuous Opacity
 Particulars: Experimental measurement in a shock
 tube of Al ionization continuum.
- Patch, Richard W.
 Work in Progress
- Pat-1 Subject: Opacity
 Journal: To be submitted to J. Quant.
 Spectrosc. Radiat. Transfer. Also,
 NASA report.
 Particulars: An effective absorption coefficient
 is defined for use in the grey gas
 transport equation as an approxima-
 tion for nongrey gases.
- Pat-2 Subject: Electronic Occupation
 Journal: NASA
 Particulars: A composition of hydrogen, including
 the partial pressures of electroni-
 cally excited states of H_2 , is
 calculated.
- Pathak, A.
 Work Completed
- Pa-1 Subject: Molecular Transitions
 Title: Franck-Condon Factors and r Centroids
 of the CaH (B-X) Band System:
 A. N. Pathak and P. D. Singh
 Journal: Proc. Phys. Soc. (London) 87, 1008
 (1966).
 Particulars: r-centroids by Nicholls' method.
- Payne, Wilbur B.
 Work Completed
- Pay-1 Subject: Bound-Bound Transitions
 Title: Relativistic Radiative Transitions:
 W. B. Payne and J. S. Levinger

Journal: Phys. Rev. 101, 1020 (1956).

Particulars: Relativistic hydrogenic transition probabilities with numerical results for Pb.

Peach, Gillian

Work Completed.

Pea-1 Subject: Free-Free Transitions

Title: A General Formula for the Calculation of Absorption Cross Sections for Free-Free Transitions in the Field of Positive Ions

Journal: M.N.R.A.S. 130, 361 (1965).

Particulars: Radial functions obtained using the one-channel quantum defect method. The various integrals involving Coulomb functions are tabulated and phases obtained from experimental data. (Code is Auto code).

Pea-2 Subject: Bound-Free Transitions

Title: A Revised General Formula for the Calculation of Atomic Photoionization Cross Sections

Journal: Memoirs of the R.A.S. 71, 13 (1967).

Particulars: As above for free-free transitions.

Pea-3 Subject: Continuous Opacity

Title: Free-Free Absorption Coefficients for Non-Hydrogenic Atoms

Journal: Memoirs of the R.A.S. 71, 1 (1967).

Particulars: Calculated using general formula previously described and a Maxwell distribution of initial energy of the free electron. Applied for H, He, He⁺, Li, C, N, O, Na, Mg, Mg⁺, Al, Si, Cl, K and Ca⁺.

Pea-4 Subject: Continuous Opacity

Title: Total Continuous Absorption Coefficients for Complex Atoms

Journal: Memoirs of R.A.S. 71, 29 (1967).

Particulars: Includes contributions to opacity from bound-free and free-free transitions obtained from general formulas described above using a Boltzmann distribution for the population of the energy levels. Applied to -C, N, O, Mg, Mg⁺, Si, Cl and Ca⁺.

Peek, James M.

Work Completed

Pee-1 Subject: Wave Functions

Title: Molecular Orbital Treatment of Hydrogen with Central Potentials and Modified Boundary Conditions:

J. M. Peek and E. N. Lassettre

Journal: J. Chem. Phys. 33, 1803 (1960).

Particulars: A generalization of the Wigner-Seitz cell model of solids to homo-polar diatomic molecules and the exact solution of this model for H₂.

Pee-2 Subject: Wave Functions

Title: Molecular Orbitals for H₂ Based on Central Potentials. Average Hamiltonian and Correlation Energy: J. M. Peek and N. Lassettre

Journal: J. Chem. Phys. 38, 2382 (1963).

Particulars: The ground state energy of H₂ is investigated using a variational principle. The correlation energy of this system is investigated by means of an appropriately modified virial equation.

Pee-3 Subject: Bound-Bound Transitions

Title: Use of Approximate Functions in Evaluating the Dorn Matrix Element for H₂⁺.

Journal: Phys. Rev. 139, A 1429 (1965).

Particulars: Several approximations to the generalized oscillator strength for 1s_g, 2p_u transitions in H₂⁺ are discussed and their range of validity as a function of internuclear separation and momentum transfer is investigated.

Pee-4 Subject: Energy Levels

Title: Eigenparameters for the 1s_g and 2p_u Orbitals of H₂⁺.

Journal: J. Chem. Phys. 43, 3004 (1965).

Particulars: Eigenparameters of the 1s_g and 2p_u electronic orbitals of H₂⁺ are tabulated for a large range of internuclear separations.

Pee-5 Subject: Bound-Bound Transitions

Title: Correlation Diagram for H₂ Oscillator Strengths: J. M. Peek and N. Lassettre

- Journal: J. Chem. Phys. 38, 2392 (1963).
 Particulars: Oscillator strengths are predicted for both a number of strong and weak bands in H_2 .
- Pee-6 Subject: Wave Functions
 Title: On the $^2\Sigma_g^+$ and $^2\Sigma_u^+$ States of the Hydrogen Molecule Ion
 Report: SC-RR-65-77 (1965).
 Particulars: The investigation of several approximate wave functions and the eigenfunctions of H_2^+ over a large range of internuclear separations. Several quantities, such as the dipole matrix element, are discussed.
- Pee-7 Subject: Bound-Bound Transitions
 Title: Proton-Hydrogen-Atom System at Large Distances. Resonant Charge Transfer and the $1s\sigma_g - 2p\sigma_u$ Eigenenergies of H_2^+
 Journal: Phys. Rev. 143, 33 (1966).
 Particulars: The relationship between charge transfer and the eigenenergies of H_2^+ at large internuclear separations is investigated.
- Work in Progress
- Pee-8 Subject: Bound-Free Transitions
 Particulars: Double excitation processes in two electron systems is under theoretical investigation.
- Penner, S. S.
 Work Completed
- Pe-26 Subject: Molecular Transitions
 Title: Approximate Band Absorption and Total Emissivity Calculations for H_2O : S. S. Penner and P. Varanasi
 Journal: J.Q.S.R.T. 5, 391 (1965).
 Particulars: See also J.Q.S.R.T. 4, 803 (1964).
- Pe-27 Subject: Molecular Transitions
 Title: Approximate Band Absorption Calculations for Methane: L. D. Gray and S. S. Penner
 Journal: J.Q.S.R.T. 5, 611 (1965).
- Pe-28 Subject: Molecular Transitions
 Title: Effect of (Partial) Overlapping of Spectral Lines on the Emissivity of $H_2O - CO_2$ Mixtures ($T \lesssim 800^\circ K$): S. S. Penner and P. Varanasi
 Journal: J. Q.S.R.T. 6, 181 (1966)
- Pfennig, H. H.
 Work Completed
- Pfe-2 Subject: Bound-Bound Transitions
 Title: Comparison of Quasistatic Line Profiles with Measurements in Balmer and Paschen Hydrogen Lines and Lines of the Diffuse Series of Neutral Helium
 Journal: J.Q.S.R.T. 6, 549 (1966).
- Pfe-3 Subject: Bound-Bound Transitions
 Title: Die Flgel der Balmer und Paschenlinien des atomaren Wasserstoffs: Ein Vergleich zwischen Theorie und Experiment.
 Journal: Z. Naturforschg, 21a, 1648 (1966).
- Pfe-4 Subject: Bound-Bound Transitions
 Title: A Critical Note on the up to now Available Stark Broadening Theories of Hydrogen: H. H. Pfennig, E. Trefftz and C. R. Vidal
 Journal: J.Q.S.R.T. 6, 557 (1966).
- Pfe-5 Subject: Bound-Bound Transitions
 Title: Tables of the Stark-Effect of Helium: H. H. Pfennig and E. Trefftz
 Report: MPI'PAE/ASTRO α 18/65 Munich Max-Planck-Institut fr Physik u. Astroph. 1966.
- Pfe-6 Subject: Bound-Bound Transitions
 Title: Zur quasistatischen Druckverbreiterung der diffusen Heliumlinien: H. Pfennig and E. Trefftz
 Journal: Z. Phys. 190, 253 (1966)
- Pfe-7 Subject: Bound-Bound Transitions
 Title: Die Druckverbreiterung der diffusen Heliumlinien, Vergleich zwischen Messung und Theorie im quasistatischen Bereich: H. Pfennig and E. Trefftz
 Journal: Z. Naturforschg, 21a, 697 (1966).
- Platas, O. R.
 Work in Progress

Pla-1 Subject: Wave Functions

Particulars: Hartree Fock-numerical solutions
of atoms.

Poletto, G.

Work Completed

Po-1 Subject: Molecular Transitions

Title: $A^2\Pi \times ^2\Sigma$ States of the CN Molecule
from the Berkeley Analysis of the
CN Red System: G. Poletto and
M. Rigutti

Journal: Nuovo Cimento 39, 519 (1965).

Particulars: Vibrational-rotational constants de-
rived from data of Davis and
Phillips.

Prag, A. B.

Work Completed

Pr-1 Subject: Bound-Bound Transitions

Title: Measured Oscillator Strengths for
the Allowed $2p-3s$ Transitions from
the Ground State in Oxygen and
Nitrogen: A. B. Prag, C. E.
Fairchild, and K. C. Clark

Journal: Phys. Rev. 137A, 1358 (1965).

Particulars: Measured in absorption.

Pratt, R. H.

Work Completed

Pra-1 Subject: Bound-Free Transitions

Title: K-Shell Photoelectric Cross Sections
from 200 keV to 2 MeV: R. H. Pratt,
Richard D. Levee, Robert L. Pexton,
and Walter Aron

Journal: Phys. Rev. 134, A898 (1964).

Pra-2 Subject: Bound-Free Transitions

Title: Polarization Correlations in Atomic
Photoeffect: R. H. Pratt, Richard
D. Levee, Robert L. Pexton, and
Walter Aron

Journal: Phys. Rev. 134 A916 (1964).

Rank, David H.

Work Completed

Ra-1 Subject: Molecular Transitions

Title: Rotational and Vibrational Constants
of CO: D. H. Rank, A. G. St.Pierre,
and T. A. Wiggins

Journal: J. Mol. Spectr. 18, 418 (1965)

Reis, Victor H.

Work Completed

Rei-1 Subject: Molecular Transitions

Title: Oscillator Strengths for the N_2
Second Positive and N_2^+ First Negative
Systems from Observations of Shock
Layers about Hypersonic Projectiles

Journal: J.Q.S.R.T. 4, 783 (1964).

Rei-2 Subject: Molecular Transitions

Title: Oscillator Strength of the CN Violet
System

Journal: J.Q.S.R.T. 5, 585 (1965).

Risberg, Gerd

Work Completed

Ris-1 Subject: Bound-Bound Transitions

Title: The Spectrum of Atomic Magnesium, Mg I
Journal: Arkiv Fysik 28, 381 (1965).

Particulars: Spectrum of Mg I was observed photo-
graphically with grating optics
(2000 - 12000 Å and beyond).

Roberts, James R.

Work Completed

Rob-1 Subject: Bound-Bound Transitions

Title: Measurements of Relative Oscillator
Strengths of Some C II Multiplets:
J. R. Roberts and K. L. Eckerle

Journal: Phys. Rev. 153, 87 (1967).

Particulars: Experimental determination of C II
f-values for lines where configura-
tion mixing is important to theo-
retical efforts.

Rob-2 Subject: Bound-Bound Transitions

Title: Measurements of Stark Profiles of
C II and Ca II Lines: J. R. Roberts
and K. L. Eckerle

Journal: Phys. Rev. (in press)

Particulars: Experimental determination of Stark
profiles of selected ionized atoms.

Work Planned

Rob-3 Subject: Bound-Bound Transitions

Particulars: Experimental determination of Al II
f-values.

Roess, Louis C.

Work Completed

Roe-1 Subject: Bound-Free Transitions

Title: The Mass Absorption Coefficient of the K-Shell According to the Dirac Relativistic Theory of the Electron

Journal: Phys. Rev. 37, 532 (1931).

Particulars: Relativistic dipole photoeffect. Values for Al, Zn, Sn, Pb.

Ruedenberg, Klaus

Work Completed

Rue-1 Subject: Wave Functions

Title: Two-Center Coulomb Integrals between Atomic Orbitals: K. O-Ohata and K. Ruedenberg

Journal: J. Math. Phys. 7, 547 (1966).

Particulars: General formulas developed for two-center Coulomb integrals between Slater type A.O.

Rue-2 Subject: Wave Functions

Title: Overlap Integrals between Atomic Orbitals: K. Ruedenberg, K. O-Ohata, and D. G. Wilson

Journal: J. Math. Phys. 7, 539 (1966).

Particulars: General formulas are developed for overlap integrals between Slater A.O. of arbitrary integer quantum numbers and certain parameter values.

Sampson, Douglas H.

Work Completed

Sa-2 Subject: Opacity

Title: Choice of an Appropriate Mean Absorption Coefficient for Use in the General Grey Gas Equations

Journal: J.Q.S.R.T. 5, 211 (1965).

Sa-3 Subject: Molecular Transitions

Title: Theory of Rotational Excitation of Homonuclear Diatomic Molecules by Slow Electrons. Application to N₂ and H₂: D. H. Sampson and R. C. Mjolsness

Journal: Phys. Rev. 140A, 1466 (1965).

Particulars: A distorted-wave theory of rotational excitation of homonuclear diatomic molecules with Σ ground states by slow electrons is given.

Schadee, Aert

Work Completed

Scha-1 Subject: Molecular Transitions

Title: The Relation Between the Electronic Oscillator Strength and the Wavelength for Diatomic Molecules.

Journal: J.Q.S.R.T. 7, 169 (1967).

Schlüter, Dieter

Work Completed

Sc-2 Subject: Bound-Free Transitions

Title: Die Berechnung der Übergangswahrscheinlichkeiten von Seriengrenzkontinua mit Anwendung auf die Schweren Edelgase

Journal: Z. Astrophys. 61, 67 (1965).

Particulars: Ne, Ar, Kr and Xe.

Sc-3 Subject: Bound-Free Transitions

Title: The Calculation of Bound-Free Transition Probabilities and their Applications to the Continuum Spectra of the Rare Gases

Journal: J.Q.S.R.T. 5, 87 (1965).

Work in Progress

Sc-4 Subject: Bound-Free Transitions

Particulars: The continuous opacity due to bound-free transitions of C, N, O, C⁺, N⁺, and O⁺ has been calculated by the quantum defect method.

Schmickley, Ronald D.

Work Completed

Schm-1 Subject: Bound-Free Transitions

Title: K-, L-, and M-Shell Atomic Photoeffect for Screened Potential Models

Report: Doctoral Dissertation (1966) Stanford University, Stanford, Calif.

Particulars: Relativistic calculations.

Schott, L.

Work Completed

Scho-1 Subject: Bound-Bound Transitions

Title: Vergleich berechneter und gemessener Starkeffekte am neutralen Stickstoff

Journal: Z. Phys. 198, 165 (1967).

Particulars: The behavior of N-lines under the influence of an inhomogeneous static

electric field have been investigated and compared with calculations.

Schwenker, R.

Work Completed

Schw-1 Subject: Molecular Transitions

Title: Experimental Oscillator Strengths of CO and CO⁺

Journal: J. Chem. Phys. 42, 1895 (1965).

Particulars: B ²Σ state of CO⁺

~ (1.01 ± .05) × 10⁻⁷ sec,
CO⁺ (1-): f ~ 7.9 × 10⁻³,

b ³Σ state of CO

~ (8.6 ± .9) × 10⁻⁸ sec,
CO (3+): f ~ 8.9 × 10⁻³.

Shackleford, W. L.

Work Completed

Sh-3 Subject: Bound-Bound Transitions

Title: Shock-Tube Measurements of Absolute gf-Values for Singly Ionized Chromium

Journal: J.Q.S.R.T. 5, 303 (1965).

Shadmi, Y.

Work Completed

Sha-1 Subject: Energy Levels

Title: Interaction between 3d and 3s Electrons in the Second Spectra of the Iron Group

Journal: Phys. Rev. 139, 43 (1965).

Particulars: 650 levels of the low even configurations of the second spectra of the Fe group are calculated. The values of the parameters appearing in the theoretical formulas are compared with 480 experimental levels.

Shumaker, J. B.

Work Completed

Shu-1 Subject: Bound-Bound Transitions

Title: Experimental Transition Probabilities for the Ar I 4s-4p Array:

J. B. Shumaker and C. H. Popenoe

Journal: J. Opt. Soc. Amer. 57, 8 (1967).

Particulars: Thermal arc measurements of transition probabilities were undertaken.

Experimental values agree with theory.

Sheridan, J.

Work Completed

She-1 Subject: Molecular Transitions

Title: Rotation and Vibration in N₂⁺ (1-) Band Excited by Ion Impact

Report: Univ. Microfilms. (Ann Arbor, Mich.) Order No. 64-11, 194, 101 pp.

Singh, P. D.

Work Completed

Si-1 Subject: Molecular Transitions

Title: Franck-Condon Factors and r-Centroids for the C-X Band System of ZnO: P. D. Singh and A. N. Pathak

Journal: Proc. Phys. Soc. (London) 90, 543 (1967).

Sobel'man, I. I.

Work Completed

Sobe-1 Subject: Bound-Bound Transitions

Title: Excitation of Atoms by Electrons and the Broadening of the Spectral Lines

Journal: Zh. Eksperim. i Teor. Fiz. 48, 965 (1965) (Russian) also: English Translation of this Journal: 21, 642 (1965).

Particulars: The relation of the theory of broadening of spectral lines in plasmas to the theory of atomic collisions is discussed.

Sobe-2 Subject: Bound-Bound Transitions

Title: Effect of Collisions on the Doppler Broadening of Spectral Lines:

S. G. Rautian and I. I. Sobel'man

Journal: Usp. Fiz. Nauk 90, 209 (1966)

(Russian) also: English translation of this Journal: 9, 701 (1967).

Particulars: Studies on the effect of collisions on the Doppler broadening by using the kinetic equation method.

Sobolev, N. N.

Work Completed

Sob-1 Subject: Molecular Transitions

Title: Determination of the Electronic Transition Strength for the First Positive Band System of Nitrogen. I:
A. P. Dronov, N. N. Sobolev, and
F. S. Faizullov

Journal: Optika i Spektroskopiia 21, 267
(1966) (Russian) Also: Optics and
Spectroscopy 21, 158 (1966) (English
Translation)

Sob-2 Subject: Molecular Transitions

Title: Determination of a Matrix Element
of the Dipole Moment of the Swan
Band System Electronic Transition
of the C₂ Molecule: A. Sviridov,
N. Sobolev, M. Novgorodov, and
G. Arutyunova

Journal: J.Q.S.R.T. 6, 875 (1966) (Russian)

Sob-3 Subject: Molecular Transitions

Title: Thermal Excitation of the Spectrum
of Molecular Nitrogen:
E. B. Brusyanova, V. N. Kolesnikov,
and N. N. Sobolev

Journal: Optika i Spektroskopiya 19, 819
(1965) (Russian) Also: Optics and
Spectroscopy 19, 453 (1965)
(English Translation).

Particulars: Arc discharge in N + O mixtures.
N₂ and N₂⁺ spectra described in re-
gion 2300 - 10,000 Å. Oscillator
strengths determined.

Sob-4 Subject: Molecular Transitions

Title: Determination of the Electronic
Transition Strength for the First
Positive Band System of Nitrogen. II:
A. Dronov, N. Sobolev, and
F. Faizullov

Journal: Optika i Spektroskopiia 21, 538
(1966) (Russian) Also: Optics and
Spectroscopy 21, 301 (1966)
(English Translation).

Particulars: Measured intensity of a group of
rotational lines of (1,0) band.

Sokoloff, J.

Work Completed

Sok-1 Subject: Wave Functions

Title: Comments on a Paper by Sharma and
Coulson, "Hartree-Fock and Correla-
tion Energies for 1s 2s ³S and ¹S
States of Helium Like Ions."

Journal: Proc. Phys. Soc. (London) 86, 1271
(1965).

Particulars: Although the notation is identical
with that of the standard H-F for-
malism, the H-F parameter of
Sharma and Coulson, ϵ_{12} , cannot be
taken as an off-diagonal Lagrangian
multiplier for the general case of
nonorthogonal orbitals.

Solomon, Philip

Work Completed

Sol-3 Subject: Molecular Transitions

Title: Infrared Absorption by CO, CN, C₂:
P. Solomon and W. Stein

Journal: Astrophys. J. 144, 825 (1966).

Particulars: CO fundamental, $^1\Sigma_g - ^1\Pi_u$ of C₂.

Somerville, W. B.

Work in Progress

Som-3 Subject: Molecular Transitions

Particulars: Calculations of transitions in hydro-
gen molecules and molecular ions.

Soshnikov, V. N.

Work Completed

Sos-1 Subject: Molecular Transitions

Title: Optical Absorption Cross Sections in
Electronic Bands of Diatomic Mole-
cules at High Temperatures

Journal: Optika i Spektroskopiya 17, 349
(1964).

Particulars: N₂, N₂⁺, O₂, NO. 2000 - 12,000°K.

Spector, N.

Work Completed

Spe-1 Subject: Energy Levels

Title: New Odd Levels of Neutral Erbium
(Er I)

Journal: J. Opt. Soc. Am. 55, 576 (1965).

Particulars: More than 400 absorption lines of
Er I have been observed between
2700 and 4700 Å.

Spindler, Robert J.

Work Completed

Sp-2 Subject: Molecular Transitions

Title: Franck-Condon Factors Based on RKR Potentials with Applications to Radiative Absorption Coefficients

Journal: J.Q.S.R.T. 2, 165 (1965).

Steele, Renate

Work Completed

St-1 Subject: Bound-Bound Transitions

Title: Wave Functions and Oscillator Strengths of Some Iron and Be-Like Ions with Configuration Mixing: R. Steele and E. Trefftz

Journal: J.Q.S.R.T. 6, 833 (1966).

Particulars: Hartree-Fock-Roothaan method.

Stewart, John C.

Work Completed

Ste-2 Subject: Bound-Bound Transitions

Title: Integrated Absorptivity of Gaussian Clusters of Lorentz Lines

Journal: J.Q.S.R.T. 2, 489 (1965).

Ste-3 Subject: Bound-Bound Transitions

Title: Wave Functions and Transition Probabilities in Scaled Thomas-Fermi Ion Potentials: J. C. Stewart and M. Rotenberg

Journal: Phys. Rev. 140, A1508 (1965).

Particulars: Evaluation of atomic and ionic oscillator strengths in semi-empirical potential.

Work in Progress

Ste-4 Subject: Opacity

Particulars: Calculation of absorption coefficient and opacity of uranium plasma. Ionic energy levels and transition probabilities from Dirac equation in approximate potential. Statistical treatment of line spectrum. (Work performed with D. E. Parks at General Atomic.)

Stoebner, André

Work Completed

Stoe-1 Subject: Molecular Transitions

Title: Sur l'observation et la caractérisation d'une bande du premier système négatif de l'azote, $B^2 \Sigma_u^+ \rightarrow X^2 \Sigma_g^+$: A. Stoebner, R. Delbourgo, and P. Laffitte

Journal: Compt. Rend. 259, 1318 (1964).

Particulars: Observation and characterization of a band in the (1-) system of nitrogen.

Stricker, W.

Work Completed

Stri-1 Subject: Molecular Transitions

Title: Band Emission of F_2 and F_2^+ in the Spectral Range between 4500-8500 Å

Journal: Z. Naturforsch., a 21, 1518 (1966).

Particulars: Term scheme of F_2 bands and edges calculated $2\Pi \rightarrow 2\Pi$ transitions are tabulated.

Tanaka, Yoshio

Work Completed

Tan-1 Subject: Molecular Transitions

Title: Absorption Spectrum of Activated Nitrogen in the 600-1100 Å Region: R. E. Huffman, J. C. Larrabee, Y. Tanaka

Journal: J. Chem. Phys. 45, 3205 (1966).

Tatum, J. B.

Work Completed

Ta-1 Subject: Molecular Transitions

Title: Hoenl-London Factors for $3\Sigma^+ - 3\Sigma^+$ Transitions

Journal: Can. J. Phys. 44, 2944 (1966).

Tien, C. L.

Work Completed

Tie-1 Subject: Bound-Bound Transitions

Title: Simple Approximate Formula for Radiation from a Line with Resonance Contours

Journal: J.Q.S.R.T. 6, 893 (1966).

Tilford, S. G.

Work Completed

Ti-1 Subject: Bound-Bound Transitions

Title: Highly Ionized Atomic Spectra

Report: AEC Accession No. 341, Rept. No. Conf 641022-2

Tilibov, A.

Work Completed

Til-1 Subject: Molecular Transitions

Title: Growth Curve for Atmospheric Absorption Bands of Molecular Oxygen:

A. Tilibov and V. Prokof'ev

Journal: Izv. Krymsk. Astrofiz. Observ. 32, 3 (1964).

Trindle, Carl

Work Completed

Tri-1 Subject: Bound-Bound Transitions, Molecular Transitions

Title: Pressure Broadening of the Rotational Lines: C. Trindle and C. Illinger

Report: NASA Accession No. N66-14233
Rept. No. AD 622505.

Vanderslice, Joseph T.

Work Completed

Va-1 Subject: Molecular Transitions

Title: : Magnetic-Dipole and Electric-Quadrupole transition Moments for the $a^1\Pi_g \leftarrow X^1\Sigma_g^+$ Transition in N_2 :
J. T. Vanderslice, P. G. Wilkinson, and S. G. Tilford

Journal: J. Chem. Phys. 42, 2681 (1965).

Particulars: The intensity distribution of the 5 branches in the $a^1\Pi_g \leftarrow X^1\Sigma_g^+$ system was analyzed in detail; results were in agreement with experiment.

Va-2 Subject: Molecular Transitions

Title: The High-Resolution Spectrum of Nitrogen from 1060 to 1520 Å. I The $a^1\Pi_g \leftarrow X^1\Sigma_g^+$ System:
J. T. Vanderslice, S. G. Tilford, and P. G. Wilkinson

Journal: Astrophys. J. 141, 395 (1965).

Particulars: Lyman-Birge-Hopfield bands observed in Kr continuum light.

Va-3 Subject: Molecular Transitions

Title: The High-Resolution Spectrum of Nitrogen from 1060-1520 Å. II The $a^1\Sigma_u^- \leftarrow X^1\Sigma_g^+$ System:

J. T. Vanderslice, S. G. Tilford, and P. G. Wilkinson

Journal: Astrophys. J. 141, 427 (1965).

Particulars: 20 bands observed.

Va-4 Subject: Molecular Transitions, Continuous Opacity

Title: The High Resolution Absorption Spectrum of Nitrogen from 1060 to 1520 Å. III The $B^1\Sigma_u^- \leftarrow X^1\Sigma_g^+$ System:
S. G. Tilford, J. T. Vanderslice, and P. G. Wilkinson

Journal: Astrophys. J. 141, 1226 (1965).

Particulars: Intensities tabulated (ν' , 0 to 18) (ν'' , 0).

Va-5 Subject: Molecular Transitions, Continuous Opacity

Title: The High-Resolution Absorption Spectrum of Nitrogen from 1060 to 1520 Å. V The $C^3\Pi_u \leftarrow X^1\Sigma_g^+$ System:
S. G. Tilford, J. T. Vanderslice, and P. G. Wilkinson

Journal: Astrophys. J. 142, 1203 (1965).

Va-6 Subject: Energy Levels

Title: Potential Curves for the Observed State of N_2 Below 11 eV: W. Benesch, J. T. Vanderslice, and P. G. Wilkinson

Journal: Astrophys. J. 142, 1227 (1965).

Particulars: $a^1\Pi_g$, $a^1\Sigma_u^-$, $B^1\Sigma_u^-$, $X^1\Sigma_g^+$, $A^3\Sigma_u^+$, $B^3\Pi_g$, $w^1\Delta_u$.

Va-7 Subject: Molecular Transitions

Title: Excitation Rates in the Auroral Nitrogen Second Positive Group:
W. Benesch, J. T. Vanderslice, and S. G. Tilford

Journal: J. Atmospheric Terrest. Phys. 28, 43 (1966).

Va-8 Subject: Molecular Transitions

Title: Franck-Condon Factors for Permitted Transitions in N_2 : W. Benesch, J. T. Vanderslice, S. G. Tilford, and P. G. Wilkinson

Journal: Astrophys. J. 144, 408 (1966).

Particulars: Table of Franck-Condon factors.
1) $B^3\Pi_g - A^3\Sigma_u^-$, 2) $B^1\Sigma_u^- - B^3\Pi_g$,

$$3) C^3\Pi_u - B^3\Pi_u, 4) a^1\Pi_g - a'^1\Sigma_u,$$

$$5) w^1\Delta_u - a'^1\Pi_g.$$

Vardya, M. S.

Work Completed

Var-1 Subject: Molecular Transitions

Title: A Method for Estimating H_2O Absorption

Journal: J.Q.S.R.T. 5, 867 (1965).

Watanabe, Takeshi

Work Completed

Wa-1 Subject: Bound-Free Transitions

Title: Theoretical Fitting of the Argon K Absorption Spectrum on a One-Electron Model

Journal: Phys. Rev. 139A, 1747 (1965).

Particulars: K absorption near edge described.

Weisner, John D.

Work Completed

Wei-1 Subject: Opacity

Report: Lockheed Rept. IMSC-B130200 and Lockheed Rept. IMSC-B130391 (Sept. 30, 1966).

Particulars: Machine computation of spectral absorption coefficients for C-H-N-O-Si mixtures using smeared band and Quantum Defect approximations.

Weiss, Andrew W.

Work in Progress

W-5 Subject: Wave Functions, Bound-Bound Transitions

Particulars: Superposition of configurations, wavefunctions and multiplet strengths are being computed for Mg I, Al II, and Si III.

Wentink, Tunis Jr.

Work Completed

Wen-1 Subject: Molecular Transitions

Title: Opacity of Low Temperature Air; Oscillator Strengths and Transition Moments of Band Systems in Air: T. Wentink, L. Isaacson, and R. J. Spindler

Report: AFWL-TR-65-139 (Dec. 1965).

Particulars: Measurement of f-numbers via radiative lifetimes in N_2 , O_2 , and NO. Transition moment and Franck-Condon factor calculations.

Work in Progress

Wen-2 Subject: Molecular Transitions

Particulars: Continuation of above.

Wen-3 Subject: Molecular Transitions

Particulars: Molecular species and band system determination of oscillator strengths (ablation products). Radiative lifetime method.

Wen-4 Subject: Molecular Transitions

Particulars: Lifetime measurements in various band systems of CO, C_2 , and other ablation products. Calculation of Franck-Condon factors and f-number determination.

Wiese, W. L.

Work Completed

Wie-6 Subject: Bound-Bound Transitions

Title: Atomic Transition Probabilities-Hydrogen through Neon: W. L. Wiese, M. W. Smith, and B. M. Glennon

Report: NBS-RS-NBS 4 Vol. 1 (1966).

Particulars: A critical data compilation.

Wie-7 Subject: Bound-Bound Transitions

Title: Relative Transition Probabilities for Prominent Ni I and Ni II Lines in the Near-Ultraviolet: G. D. Bell, D. R. Paquette, and W. L. Wiese

Journal: Astrophys. J. 143, 559 (1966).

Work in Progress

Wie-8 Subject: Bound-Bound Transitions

Particulars: Experimental determination of transition probabilities for S I and S II.

Wie-9 Subject: Bound-Bound Transitions

Particulars: Tabulation of available transition probabilities for elements Na through Ca.

Wilkins, Roger L.

Work Completed

Wilk-1 Subject: Continuous Opacity

Title: Continuous Absorption Coefficients of Chlorine

- Journal: J.Q.S.R.T. 4, 775 (1964).
 Particulars: Calculations for $T = 291^{\circ}\text{K}$ to 2400°K .
- Wilkinson, P. G.
 Work Completed
- Wilki-1 Subject: Bound-Bound Transitions
 Title: Oscillator Strengths of the Resonance lines of the rare gases - I. Krypton
 Journal: J.Q.S.R.T. 5, 503 (1965).
- Wray, Kurt L.
 Work Completed
- Wra-1 Subject: Molecular Transitions
 Title: Nitrogen and Air Radiation in the Near IR: K. L. Wray and T. J. Connolly
 Journal: J.Q.S.R.T. 5, 111 (1965).
- Wra-2 Subject: Molecular Transitions
 Title: Electronic f-Number of the N_2^+ (1-) Band System: K. L. Wray and T. J. Connolly
 Journal: J.Q.S.R.T. 5, 633 (1965).
- Wra-3 Subject: Molecular Transitions
 Title: Excitation Mechanisms for the N_2 (1+) Band System in Shock Heated Air: W. Wray and D. Teare
 Report: Proc. Intern. Conf. Phys. Electron. Atom. Collisions 5rd, Univ. Coll. London 1763, 1123 (1964).
- Wuilleumier, Francois
 Work Completed
- Wu-1 Subject: Free-Free Transitions
 Title: Continuous Analysis of the Absorption Spectra of Argon and Neon between 2 and 8 Å
 Journal: J. Phys. (Paris) 26, 776 (1965). (French)
 Particulars: Experimental, bremsstrahlung used as a source.
- Yakimets, V. V.
 Work Completed
- Y-1 Subject: Bound-Bound Transitions
 Title: Theory of Broadening of Spectral Lines
- Journal: Zh. Eksp. Teo. Fiz. 51, 1469 (1966) (Russian) Also: Soviet Physics JETP 24, 990 (1967) (English Translation).
 Particulars: Greens function method.
- Young, Charles
 Work Completed
- You-1 Subject: Bound-Bound Transitions
 Title: Calculation of the Absorption Coefficient for Lines with Combined Doppler and Lorentz Broadening
 Journal: J.Q.S.R.T. 5, 549 (1965).
- Young, L. A.
 Work Completed
- Yo-1 Subject: Molecular Transitions
 Title: Dipole Moment Function and Vibration-Rotation Matrix Elements of CO: L. A. Young and W. J. Eachus
 Journal: J. Chem. Phys. 44, 4195 (1966).
- Zapesochnyi, I. P.
 Work Completed
- Zap-1 Subject: Bound-Bound Transitions
 Title: Excitation Function of Spectral Lines of Rubidium and Cesium: I. P. Zapesochnyi and L. L. Shimon
 Journal: Tr. Komis. po Spektroskopii, Akad. Nauk SSSR 2, 175 (1964) (Russian)
 Particulars: A method of electron impact with use of photoelectric recording was used to study excitation functions of 25 spectral lines of Cs and 15 lines of Rb.
- Zare, Richard Neil
 Work Completed
- Zar-1 Subject: Energy Levels, Wave Functions
 Title: Correlation Effects in Complex Spectra: Energy Levels of the Magnesium Isoelectronic Sequence
 Journal: J. Chem. Phys. 45, 1966 (1966)
 Particulars: Configuration interaction using Hartree-Fock Slater Determinantal Wavefunctions.
- Zar-2 Subject: Molecular Transitions
 Title: Franck-Condon Factors for Electronic

Band Systems of Molecular Nitrogen: R. N. Zare, E. O. Larsson, and R. A. Berg

Journal: J. Mol. Spectry. 15, 117 (1965).

Particulars: Systems considered: $C \ ^3\Pi_u - B \ ^3\Pi_g$,
 $B \ ^3\Pi_g - A \ ^3\Sigma_u^+$, $A \ ^3\Sigma_u^+ - X \ ^1\Sigma_g^+$,
 $a \ ^1\Pi_g - X \ ^1\Sigma_g^+$ and $C \ ^3\Pi_u - X \ ^1\Sigma_g^+$.

Work in Progress

Zar-3 Subject: Bound-Bound Transitions

Particulars: Absolute line strengths are being calculated for transition along the magnesium isoelectronic sequence using correlated wavefunctions composed of linear combinations of HFS determinantal wavefunctions.

Zhislin, G. M.

Work Completed

Zh-1 Subject: Energy Levels

Title: Atomic Energy Levels in a Continuous Spectrum: G. M. Zhislin and A. G. Sigalov

Journal: Theor. i Eksperim. Khim., Akad. Nauk Ukr., SSR 2, 109 (1966) (Russian)

Zwaan, Cornelis

Work Completed

Zw-2 Subject: Bound-Bound Transitions

Title: Note on the Normalization of the NBS gf-Values and on the Solar Abundances of the Alkali Metals

Journal: Bull. Astr. Inst. Netherlands 19, 1 (1967).

Particulars: The normalization factor used by Corliss and Bozman to reduce the NBS gf-values to an absolute scale is investigated.

Work in Progress

Zw-3 Subject: Continuous Opacity

Particulars: The role of truly continuous absorption by molecules in the solar UV (1500 - 2500 Å). Completion is delayed because of lack of data.

IV. Researchers in the Opacity Field

<u>Name</u>	<u>Organization</u>	<u>Address</u>
Abels, L. L.	University of Illinois	Department of Physics Chicago Circle Urbana, IL 61803
Alamichel, C.	Faculté des Sciences d'Orsay	Orsay, Seine et Oise France
Ali, A.W.K.	University of Maryland	Physics Department College Park, MD 20742
Allen, C. W.	University of London Observatory	Mill Hill Park London N.W. 7 England
Allen, R. A.	Avco Everett Research Laboratory	2385 Revere Parkway Everett, MA 02149
Altschuler, Martin D.	High Altitude Observatory	Boulder, CO 80302
Anand, Surendra P. A.	California Institute of Technology	Pasadena, CA 91109
Anton, H.	Justus Liebig University	1. Physikalisches Inst. Giessen Germany
Appleton, John P.	General Motors Defense Research Laboratory	6767 Hollister Ave. Goleta, CA 93107
Armstrong, Baxter H.	IBM Systems Research Center	4339 Miranda Ave. Palo Alto, CA 94306
Arpigny, Claude	Institut d'Astrophysique	Cointe-Sclassin Belgium
Ashley, E. N. Jr.	E. G. and G. Inc.	95 Brookline Ave. Boston, MA 02215
Bagus, Paul S.	Argonne National Laboratory	Argonne, IL 60440
Banks, Harvey W.	Georgetown University Observatory	Washington, DC 20007
Baranger, Michel	Carnegie Institute of Technology	Physics Department Pittsburgh, PA 15213
Barnes, Bentley T.	General Electric Company	Lamp Research Laboratory Nela Park Cleveland, OH 44112
Bartky, Charlotte Decker	Philco Research Laboratory	Newport Beach, CA 92663
Bauer, Ernest	Institut Defense Analyses	400 Army-Navy Dr. Arlington, VA 22202
Bayer-Helms, Friedrich	Physikalisch-Technische Bundesanstalt	33 Braunschweig Germany
Bearden, Alan J.	Johns Hopkins University	Physics Department Baltimore, MD. 21218
Beaty, Earl C.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Bell, K. L.	Queen's University	Department of Applied Math. Belfast 7 Northern Ireland

Name	Organization	Address
Bernstein, Jeremy	New York University	Physics Department New York, NY 10003
Bethe, Hans	Laboratory for Nuclear Studies	Cornell University Ithaca, NY 14950
Bezzerrides, Bandel	University of California	Physics Department Berkeley, CA 94720
Bibermann, L. M.	Moscow Power Institute	Moscow USSR
Biermann, Ludwig	Max-Planck-Institut für Astrophysik	8 München 23 Föhringer Ring 6 Germany
Blake, A. J.	University of Adelaide	Physics Department Adelaide Australia
Bleekrode, R.	N. V. Phillips' Gloeilampenfabrieken	Philips Research Laboratories Eindhoven Netherlands
Bode, Gerhard	Institut für Theoretische Physik u. Universitäts Sternwarte	23 Kiel Olshausenstr. 40-60 Germany
Boldt, Günther	Max-Planck-Inst. für Physik u. Astrophysik	8 München 23 Föhringer Ring 6 Germany
Borowitz, Sidney	New York University	Physics Department Bronx, NY 10453
Brandt, Werner	New York University	Physics Department New York, NY 10003
Bréchet, Sylvie	Observatoire de Paris	Meudon, Seine-et-Oise France
Breene, R. G. Jr.	Physical Studies, Inc.	710 Mill St. Reno, NV 89502
Brehm, Burkhard	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Brennen, W.	Harvard University	Gibbs Chemical Laboratory Cambridge, MA 02138
Brogordskii, M. M.	State University	Moscow USSR
Brown, William M.	Lockheed Research Laboratory	Palo Alto, CA 94301
Broyles, Arthur A.	University of Florida	Physics Department Gainesville, FL 32603
Bryant, B. W.	Johns Hopkins University	Physics Department Baltimore, MD 21218
Burlee, P.	Atomic Energy Research Establishment	Harwell, Didcot, Berks. England
Burwell, W. G.	United Aircraft Research Laboratory	East Hartford, CT 06108
Cade, Paul E.	University of Chicago	Physics Department Chicago, IL 60637
Cairns, R. Bryan	Geophysics Corp. of America	Technology Division Bedford, MA 01730

<u>Name</u>	<u>Organization</u>	<u>Address</u>
Callear, A.	University of Cambridge	Physical Chemistry Laboratory Cambridge England
Calvert, James B.	University of Denver	Physics Department Denver, CO 80210
Carpenter, Robert O'B.	Geophysics Corp. of America	Bedford, MA 01730
Carter, W. J.	Johns Hopkins University	Physics Department Baltimore, MD 21218
Chandrasekhar, S.	Laboratory for Astrophysics and Space Research	922 E. 56th Street Chicago, IL 60637
Chang, Tai Yup	University of Wisconsin	Theoretical Chemistry Institute Madison, WI 53706
Ch'en, Shang-Yi	University of Oregon	Physics Department Eugene, OR 97403
Chiarella, C.	University of Sydney	Department of Applied Mathematics Sydney Australia
Childs, William J.	Argonne National Laboratory	Argonne, IL 60440
Chiu, Ying-Nan	Catholic University of America	Chemistry Department Washington, DC 20017
Cho, Seikichi	Gunma University	Maebashi Japan
Churchill, Dewey R. Jr.	Lockheed Missile and Space Company	Palo Alto Research Laboratory 3251 Hanover Street Palo Alto, CA 94304
Clough	Air Force Cambridge Research Laboratories	Bedford, MA 01730
Codling, K.	National Bureau of Standards	Washington, DC 20234
Cohen, Stanley	Argonne National Laboratory	9700 Cass Ave. Argonne, IL 60440
Condon, Edward U.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Cook, Gilbert R.	Aerospace Corporation	P. O. Box 95085 Los Angeles, CA 90045
Cooper, John	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Cottrell, T. L.	University of Edinburgh	Scotland
Cox, Arthur N.	Los Alamos Scientific Laboratory	J-15 Los Alamos, NM 87544
Cox, John P.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Curcio, J. A.	U. S. Naval Research Laboratory	Washington, DC 20360
Curnutte, Basil, Jr.	Kansas State University	Physical Science Department Manhattan, KS 66504
Czyzak, S. J.	Aeronautical Research Laboratory	Wright-Patterson Air Force Base OH 45433

Name	Organization	Address
Dalgarno, A.	Queen's University	Physics Department Belfast 7 Northern Ireland
Darling, Byron T.	Laval University	Physics Department Québec 10 Québec Canada
Davis, Sumner P.	University of California	Physics Department Berkeley, CA 94720
Day, Richard A.	University of Maryland	Physics Department College Park, MD 20742
Deutsch, Thomas F.	Raytheon Research Division	28 Seyon Street Waltham, MA 02154
DeWitt, Hugh E.	Lawrence Radiation Laboratory	University of California P. O. Box 808 Livermore, CA 94551
Dickerman, Philip J.	I.I.T. Research Institute	10 W., 35th Street Chicago, IL 60616
Doughty, N. A.	University of Western Ontario	Physics Department London, Ontario Canada
Douglas, A. E.	National Research Council	Division of Pure Physics Ottawa, Ontario Canada
Dowling, Jerome M.	Acrospace Corp.	Space Physics Laboratory Los Angeles, CA 90053
Dressler, Kurt	Princeton University	Astrophysics Science Department 265 Fitzrandolph Rd. Princeton, NJ 08540
Druetta, M.	Laboratoire de Physique de l'Atmosphère Faculté des Sciences de Lyon	Lyon France
Dugan, C. H.	Smithsonian Institution	Astrophysical Observatory Cambridge, MA 01439
Duncan, A.B.F.	University of Rochester	Chemistry Department Rochester, NY 14627
Dunn, J. L.	University of California	Physics Department Santa Barbara, CA 93016
Durand, J.	Laboratoire de Physique des Plasmas	Av. Ruchonnet 2 Lausanne Switzerland
Eckerle, Kenneth L.	National Bureau of Standards	Washington, DC 20234
Edwards, D. K.	University of California	Department of Engineering Los Angeles, CA 90007
Erikson, Gunnar	University of Oslo	Institute of Theoretical Astrophysics Oslo Norway
Fairbairn, A. R.	Avco Everett Research Laboratory	Everett, MA 02149
Fano, U.	National Bureau of Standards	Washington, DC 20234

Name	Organization	Address
Fawcett, B. C.	Culham Laboratory	North Abingdon England
Ferriso, C. C.	General Dynamics/Astronautics	Space Science Laboratory San Diego, CA 92112
Fischer, David W.	U.S.A.F. Materials Laboratory	Wright-Patterson Air Force Base Dayton, OH 45433
Fishburne, E. Stokes	Ohio State University	Columbus, OH 43210
Florance, E. T.	Geophysics Corporation of America	Bedford, MA 01730
Fowler, Richard G.	University of Oklahoma	Physics Department Norman, OK 73069
Fraenkel, B. S.	Hebrew University	Jerusalem Israel
Freed, Karl F.	Harvard University	Chemistry Department Cambridge, MA 02138
Froese, C.	Harvard College Observatory	Cambridge, MA 02138
García, José D., Jr.	University of Wisconsin	Physics Department Madison, WI 53705
Garstang, Roy H.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Garton, W.R.S.	Imperial College of Sciences and Technology	London, S.W. 7 England
Gavrila, Mihai	Parhon University	Department of Physics Bucharest Roumania
Gaydon, A. G.	Imperial College	Department of Chemical Engineering and Chemical Technology London, S.W. 7 England
Gelins, E.	Library of Congress	Washington, DC 20540
Generosa, John	Air Force Weapons Laboratory	Kirtland Air Force Base NM 87117
Gerjuoy, Edward	University of Pittsburgh	Physics Department Pittsburgh, PA 15213
Gilmore, Forrest R.	The RAND Corporation	1700 Main Street Santa Monica, CA 90406
Godfredson, Eugene A.	Institute of Education	P. O. Box 9184 Dar Es Salaam Tanzania
Golden, Stanley A.	North American Aviation	Rocketdyne Division Canoga Park, CA 91303
Goldstein, Robert	TRW Systems	1 Space Park Redondo Beach, CA 90278
Gombás, P.	Universität für Technische Wissenschaften	Physikalisches Institut Budapest Hungary

Name	Organization	Address
Goodisman, Jerry	University of Illinois	Chemistry and Chemical Engineering Department Urbana, IL 61803
Gordon, R. G.	Harvard University	Department of Chemistry Cambridge, MA 02138
Grant, Ian P.	Scientific Research Council	Atlas Computer Laboratory Chilton, Didcot, Berkshire England
Grasberger, William	Lawrence Radiation Laboratory	P. O. Box 808 Livermore, CA 94720
Gray, L. D.	California Institute of Technology	Pasadena, CA 91109
Green, Joseph M.	The RAND Corporation	Physics Division 1700 Main Street Santa Monica, CA 90401
Green, Louis C.	Strawbridge Observatory	Haverford College Haverford, PA 19041
Griem, Hans R.	University of Maryland	Department of Physics College Park, MD 20742
Gusnow, Michael A.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Hallim, Reinhold	University of Uppsala	Department of Physics Uppsala Sweden
Hanus, W.	N. Copernicus University	Thorn Poland
Harrington, J. A.	Avco Corporation	Wilmington, MA 01887
Halevi, P.	Israel Institute of Technology	Department of Physics, Technion Haifa Israel
Hayakawa, Sachio	University of Nagayo	Nagayo Japan
Hedde, Douglas W. O.	University of York	Heslington, York England
Henning, Hinrich	Universität Kiel	Inst. der Experimentalphysik 23 Kiel Olshausenstr. 40-60 Germany
Henvey, Louis G.	Leuschner Observatory	University of California Berkeley, CA 94720
Herbig, G. H.	Lick Observatory	University of California Mt. Hamilton, CA 95140
Hertzberg, Martin	Republic Aviation Corp.	Paul Moore Research and Development Center Farmingdale, Long Island, NY 11735
Herzberg, G.	National Research Council	Division of Pure Physics Ottawa Canada

Name	Organization	Address
Hindmarsh, W. R.	University Newcastle upon Tyne	Physics Department England
Hofmann, Walter	Max-Planck-Inst. für Extraterrestrische Physik	8046 Garching Germany
Hovenier, Joachim W.	Sterrewacht te Leiden	The Netherlands
Huebner, Walter F.	Los Alamos Scientific Laboratory	T-DO Los Alamos, NM 87544
Huffman, Robert E.,	Air Force Cambridge Research Laboratory	Bedford, MA 01730
Hultberg, Sölve	Forskningsinstitutet f. Atomfysik	Stockholm 50 Sweden
Huo, Winifred M.	Harvard University	Chemistry Department 12 Oxford Street Cambridge, MA 02138
Hurle, I. R.	Shell Research Ltd.	Thornton Research Center Chester England
Hylleraas, Egil A.	University of Oslo	Institute for Theoretical Physics Oslo Norway
Irvine, William M.	University of Massachusetts	Department of Physics and Astronomy 229 Hasbrouck Building Amherst, MA 01002
Jacobs, Theodore A.	Aerospace Corporation	El Segundo, CA 90245
Jacobson, H. C.	Yale University	Physics Department New Haven, CT 06520
Jain, D. C.	New York University	Department of Chemistry University Heights New York, NY 10003
Jansson, R.E.W.	Central Electricity Generating Board	Marchwood Engineering Laboratory Marchwood, Southampton, Hants England
Jenč, F.	Czechoslovak Academy of Sciences	Institute of Physical Chemistry Prag Czechoslovakia
Jeunehomme, Michel	Heliodyne Corporation	7810 Burnet Ave. Van Nuys, CA 91405
Johansson, Lennart	University of Lund	Department of Physics Lund Sweden
John T. L.	University College London	Department of Physics London England
Johns, J. W.	National Research Council	Ottawa Canada
Johnston, Robert R.	Lockheed Palo Alto Research Laboratory	3251 Hanover Street Palo Alto, CA 94304

Name	Organization	Address
Joshi, K.	National Physics Laboratory	Optical Division New Delhi India
Jordan, C.	University of London Observatory	Mill Hill Park London England
Jungen, Ch.	University of Basel	Institute of Physics Basel Switzerland
Kandel, R.	Observatoire Meudon	Paris-Meudon France
Kaslin, V.	Lebedev Physics Institute	Moscow Russia
Katterbach, Klaus	Max-Planck-Inst. f. Astrophysik	8 München 23 Föhringer Ring 6 Germany
Kegel, Wilhelm H.	Inst. f. Plasmaphysik	8046 Garching Germany
Kelly, Paul S.	Lockheed Palo Alto Research Laboratory	3251 Hanover St., Bldg. 201 Palo Alto, CA 94304
Kivel, Bennett	Avco Everett Research Laboratory	2385 Revere Beach Parkway Everett, MA 02149
Klose, Jules Z.	National Bureau of Standards	Atomic Physics Division Washington, DC 20234
Koontz, Doyle	Los Alamos Scientific Laboratory	T-DO Los Alamos, NM 07544
Kopp, Ingvar	University of Stockholm	Institute of Physics Stockholm Sweden
Kovacs, I.	Polytechnic University	Budapest Hungary
Krascella, Nick L.	United Aircraft Research Laboratory	East Hartford, CT 06108
Krupenie, Paul H.	National Bureau of Standards	Washington, DC 20234
Kulander, J. L.	Lockheed Palo Alto Research Laboratory	3251 Hanover Street Palo Alto, CA 94304
Landshoff, Rolf	Lockheed Palo Alto Research Laboratory	3251 Hanover Street Palo Alto, CA 94304
Langhoff, Peter W.	Cornell Aeronautic Laboratory, Inc.	Buffalo, NY 14221
Lapp, Marshall	General Electric Research and Development Center	P. O. Box 8 Schenectady, NY 12301
Lassetre, E. N.	Mellon Institute	4400 5th Ave. Pittsburgh, PA 15213
Lavercombe, B. J.	Imperial College of Science and Technology	Department of Physics London England
Lawley, K. P.	Brown University	Metcalf Chemistry Laboratory Providence, RI 02912

Name	Organization	Address
Lawrence, George M.	Princeton University Observatory	Peyton Hall Princeton, NJ 08540
Lefebvre-Brion, H.	Centre de Mécanique Ondulatoire Appliquée	Paris 19 ^e France
Liberman, David A.	Los Alamos Scientific Laboratory	T-4 Los Alamos, NM 87544
Lin, Sheng Hsien	Columbia University	Department of Chemistry New York, NY 10027
Linton, C.	York University	Physics Department Toronto, Ontario Canada
Lorents, D. C.	Stanford Research Institute	Molecular Physics Department Menlo Park, CA 94025
Lüscher, Edgar	Technische Hochschule München	Physik Department 8 München 2 Arcisstr. 21 Germany
Ludwig, Claus B.	General Dynamics/Astronautics	Space Science Laboratory San Diego, CA 92112
Lundqvist, Stig	Inst. f. Theoretical Physics	Göteborg Sweden
Lutz, Michael A.	Hughes Research Laboratory	Malibu, CA 90265
Magee, John L.	University of Notre Dame	Radiation Laboratory Notre Dame, IN 46556
Main, Roger P.	Heliodyne Corp.	7810 Burnet Ave. Van Nuys, CA 91405
Malli, G. L.	University of Chicago	Laboratory of Molecular Structure and Spectra Department of Physics Chicago, IL 60601
Malone, B. S.	California Institute of Technology	Chemistry Engineering Laboratories Pasadena, CA 91109
Mandell, David A.	State University of New York	Department of Mechanics Stony Brook, Long Island, NY 11790
Marrus, R.	University of California	Lawrence Radiation Laboratory Berkeley, CA 94720
Martenev, P. J.	United Aircraft Research Laboratory	East Hartford, CT 06108
Matese, John J.	University of Notre Dame	Physics Department South Bend, IN 46556
Matsunaga, Frederick M.	University of Hawaii	Physics Department Honolulu, Hawaii 96822
Matsushima, S.	University of Iowa	Observatory Iowa City, IA 52240
Mayer, Harris L.	Institute of Defense Analysis	400 Army Navy Drive Arlington, VA 22202

Name	Organization	Address
Mayers, David F.	Oxford University	Computing Laboratory 19 Parks Road Oxford England
McFarlane, R. A.	Bell Telephone Laboratory	Murray Hill, NJ 07971
McLafferty, George H.	United Aircraft Research Laboratory	East Hartford, CT 06108
McTavish, Charles J.	Wright Patterson Air Force Base	AFFDL (FDTR), OH 45433
Meyer, Claude	Faculté des Sciences, Orsay	Laboratoire d' Infrarouge Chimie physique Orsay, Seine-et-Oise France
Meyerott, Roland E.	Lockheed Palo Alto Research Laboratory	3251 Hanover Street Palo Alto, CA 94304
Miescher, E.	University of Basel	Institute of Physics Basel Switzerland
Milford, S. N.	Grumman Aircraft Engineering Corporation	Research Department Geo-Astrophysics Section Bethpage, NY 11714
Miller, R. E.	Johns Hopkins University	Baltimore, MD 21205
Milne, E. L.	University of California	Santa Barbara, CA 93106
Mitchell, G.	Wright Jr. College	Chicago, IL
Mjolsness, Raymond C.	Los Alamos Scientific Laboratory	T-12 Los Alamos, NM 87544
Moise, N. L.	California Institute of Technology	Physics Department Pasadena, CA 91109
Monfils, Andre G.	Université de Liège	Institut d'Astrophysique Cointe/Sclessin Belgium
Moore, Charlotte E. (Mrs. Sitterly)	National Bureau of Standards	222.00 Washington, DC 20234
Moszkowski, Steve A.	The RAND Corp.	1700 Main Street Santa Monica, CA 90401
Müller, Karl Gerhard	Universität Bonn	Institut f. Theoretische Physik Bonn Germany
Mulliken, Robert S.	University of Chicago	Physics Department Chicago, IL 60637
Nagel, Bengt C. H.	Royal Institute of Technology	Department of Mathematical Physics Stockholm Sweden
Nakayama, T.	Physics International Co.	Berkeley, CA 94704
Narasimham, N. A.	Atomic Energy Establishment Trombay	Spectroscopic Division 414A, Cadell Road Bombay-28 India

Name	Organization	Address
Nerem, Robert M.	Ohio State University	Columbus, OH 43210
Nesbet, Robert K.	IBM Research Laboratory	San Jose, CA 95114
Nicholls, Ralph W.	York University	Department of Physics 2275 Bayview Avenue Toronto 12, Ontario Canada
Nishimara, Hiroyuki	University of Nagoya	Department of Physics Nagoya Japan
Norcross, D. W.	Sperry Rand Research Center	Sudbury, MA 01776
Ohmura, Takashi	Nihon University	Department of Physics College of Science and Engineering Kanda Tokyo Japan
Öhrn, Yngve	University of Uppsala	Quantum Chem. Group f. Research in Atomic, Molecular and Solid- State Theory Uppsala Sweden
Olsson, Per O. M.	Royal Institute of Technology	Department of Mathematical Physics Stockholm Sweden
Ory, Horace A.	The RAND Corp.	1700 Main Street Santa Monica, CA 90406
Parkinson, William H.	Harvard University	Physics Department Cambridge, MA 02138
Patch, Richard W.	NASA Lewis Research Center	21000 Brookpark Road Cleveland, OH 44135
Pathak, A. N.	Bhagalpur University	Physics Department Bihar India
Payne, Wilbur B.	Johns Hopkins University	Operations Research Office 6935 Arlington Rd. Bethesda, MD 21218
Peach, Gillian	University College	Physics Department Gower Street London W. C. 1 England
Peek, James M.	Sandia Corporation	5121 Sandia Base Albuquerque, NM 87115
Penner, Stanford S.	University of California, San Diego	Department of Aerospace and Mechanical Engineering Sciences La Jolla, CA 92038
Pfennig, Hans H.	Max-Planck-Institut f. Physik und Astrophysik	8 München 23 Föhringer Ring 6 Germany
Platas, O. R.	Lockheed Palo Alto Research Laboratory	3251 Hanover Street Palo Alto, CA 94304
Poletto, G.	Osservatorio Astrofisico di Arcetri	Firenze Italy
Prag, A. B.	Aerospace Corporation	Space Physics Division El Segundo, CA 90245

Name	Organization	Address
Pratt, R. H.	University of Pittsburgh	Department of Physics Pittsburgh, PA 15213
Rank, David H.	Pennsylvania State University	Osmond Laboratory University Park, PA 16802
Reis, Victor H.	NASA	Ames Research Center Moffet Field, CA 94035
Risberg, Gerd	University of Lund	Department of Physics Lund Sweden
Roberts, James R.	National Bureau of Standards	Washington, DC 20234
Roess, Louis C.	Texaco, Inc. (Beacon, NY)	Box 235 Fishkill, NY 12524
Ruedenberg, Klaus	Iowa State University	Chemistry Department Ames, IA 50010
Ruppel, Hans M.	Los Alamos Scientific Laboratory	T-12 Los Alamos, NM 87544
Sampson, Douglas H.	Pennsylvania State University	Astronomy Department University Park, PA 16802
Schadee, Aert	Mount Wilson and Palomar Observatory	Pasadena, CA 91101
Schlüter, Dieter	Sternwarte Bergedorf	205 Hamburg 80 Gojenbergsweg 112 Germany
Schmickley, Ronald D.	Lockheed Palo Alto Research Laboratory	3251 Hanover Street Palo Alto, CA 94304
Schott, L.	Institut f. Plasmaphysik der Kernforschungsanlage	Jülich des Landes Nordrhein- Westfalen Germany
Schwenker, R.	E. I. du Pont de Nemours and Co.	Radiation Physics Laboratory Engineering Department Wilmington, DE 19899
Shackleford, W. L.	California Institute of Technology	David and Florence Guggenheim Jet Propulsion Center Pasadena, CA 91109
Shadmi, Y.	Hebrew University	Jerusalem Israel
Sheridan, J. R.	University of Washington	Seattle, WA 98105
Shumaker, John B., Jr.	National Bureau of Standards	Washington, DC 20234
Singh, P. D.	University of Gorakhpur	Department of Physics Gorakhpur, U. P., India
Sobel'man, I. I.	P. N. Lebedev Physics Institute Academy of Sciences	3-a Miusskaya 3 Moscow, USSR
Sokoloff, J.	Lockheed Missiles and Space Co.	Research Laboratory Palo Alto, CA 94301
Solomon, Philip M.	Columbia University	Department of Astronomy New York, NY 10027
Somerville, W. B.	University College	Department of Astronomy London, W. C. 1 England

Name	Organization	Address
Spector, N.	National Bureau of Standards	Washington, DC 20234
Spindler, Robert J.	Avco. Corp.	Wilmington, MA 01887
Steele, Renate	Max-Planck-Institut f. Physik u. Astrophysik	8 München 23 Föhringer Ring 6 Germany
Stewart, John C.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Stewart, John N.	Los Alamos Scientific Laboratory	J-15 Los Alamos, NM 87544
Stoebner, André	Sorbonne	Laboratoire de Chimie générale et D.R.M.E. Paris France
Stricker, W.	DVL Inst. Rakententreibstoffe	Stuttgart-Vaihingen Germany
Tanaka, Yoshio	Air Force Cambridge Research Laboratory	Bedford, MA 01730
Tatum, J. B.	York University	Physics Department Toronto, Ontario Canada
Tien, C. L.	University of California	Berkeley, CA 94720
Tilford, S. G.	Naval Research Laboratory	Washington, DC 20390
Traving, G.	Institut für Theoretische Physik	Neue Universität 23 Kiel Olshausenstr. 40-60 Germany
Treffitz, Eleonore	Max-Planck-Institut für Physik und Astrophysik	8 München 23 Föhringer Ring 6 Germany
Trindle, Carl	Tufts University	Medford, MA 02155
Unsöld, A.	Institut für Theoretische Physik	Neue Universität 23 Kiel Olshausenstr. 40-60 Germany
van de Hulst, H. E.	Sterrewacht	Leiden The Netherlands
Vanderslice, Joseph T.	University of Maryland	Institute of Molecular Physics College Park, MD 20742
Vardya, M. S.	Joint Institute for Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Watanabe, Takeshi	Cornell University	Physics Department Ithaca, NY 14850
Weisner, John D.	Lockheed Missiles and Space Co.	Department 55-24, Bldg. 541 111 Lockheed Way Sunnyvale, CA 94088
Weiss, Andrew W.	National Bureau of Standards	Washington, DC 20234
Weissler, Gerhard L.	University of Southern California	Physics Department Los Angeles, CA 90007

Name	Organization	Address
Wentink, Tunis, Jr.	Avco Corporation	Research and Technology Laboratory Space Systems Division Wilmington, MA 01887
Wiese, Wolfgang L.	National Bureau of Standards	Washington, DC 20234
Wilkins, Roger L.	Aerospace Corp.	El Segundo, CA 90245
Wilkinson, P. G.	U. S. Naval Research Laboratory	E. O. Hulbert Center for Space Research Washington, DC 20390
Wray, Kurt L.	Avco Corporation	2385 Revere Beach Parkway Everett, MA 02149
Wurster, Walter H.	Cornell University	Cornell Aeronautical Laboratory Box 235 Buffalo, NY 14221
Yakimets, V. V.	Moscow Inst. of Engineering Physics	Moscow USSR
Young, Charles	University of Michigan	High Altitude Engineering Laboratory Ann Arbor, MI 48104
Young, L. A.	Avco Everett Research Laboratory	Everett, MA 02149
Zare, Richard Neil	Joint Institute of Laboratory Astrophysics	University of Colorado Boulder, CO 80302
Zink, John W.	Lawrence Radiation Laboratory	P. O. Box 808 Livermore, CA 94720
Zwaan, Cornelis	Utrecht Observatory	Utrecht The Netherlands