Dr. 1382

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LBL-91 Revised
UC-34C
March 1983

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CURRENT EXPERIMENTS IN ELEMENTARY-PARTICLE PHYSICS

C.G. Wohl, F.E. Armstrong, A. Rittenberg, T.G. Trippe, G.P. Yost
Particle Data Group, Lawrence Berkeley Laboratory, Berkeley, CA 94720 USA

L. Addis
Stanford Linear Accelerator Center, Stanford, CA 94305 USA

P. Joos
DESY, Notkestrasse 85, D-2000 Hamburg-52, Germany

Y. Oyanagi
University of Tsukuba, Sakura-mura, Niihari-gun, Ibaraki-ken 305, Japan

D.C. Dodder
Los Alamos National Laboratory, Los Alamos, NM 87545, USA

S.N. Grudtsin, Yu.G. Ryabov
Institute for High Energy Physics, Serpukhov, Protvino, Moscow Region, USSR

R. Frosch
SIN, Swiss Institute for Nuclear Research, CH-5234 Villigen, Switzerland

A. Olin
TRIUMF, 4004 Westbrook Mall, Vancouver BC V6T 2A3, Canada

LAWRENCE BERKELEY LABORATORY
University of California

Prepared for the U.S. Department of Energy under contract DE-AC03-76SF00098

MASTER

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EXAMPLE FROM THE MICROFICHE (SEE INSIDE BACK COVER)

FOR ABBREVIATIONS USED FOR PARTICLES, INSTITUTIONS, ETC., SEE THE YELLOW PAGES.

CESR-CUSB (1978); APPROVED FEB 1978; STARTED NOV 1979.

CUSB -- HIGH RESOLUTION CALORIMETER TO STUDY THE UPSILON SPECTROSCOPY AND B PHYSICS

COLU -- P.FRANZINI(*SPOKESPERSON), K.HAN, S.W.HERB, D.SON, J.K.YOH, S.YOUSSEF

LSU -- R.IMLAY, G.LEVMAN, W.METCALF, V.SREEDHAR

MPIM -- H.DIETL, G.EIGEN, E.LORENZ, G.MAGERAS, F.PAUSS, H.VOGEL

STON -- G.FINOCCHIARO, J.E.HORSTKOTTE, C.KLOPFENSTEIN, J.LEE-FRANZINI, R.D.SCHAMBERGER,
M.SIVERTZ, L.J.SPENCER, P.M.TUTS

ACCELERATOR=CESR; DETECTOR=CUSB

E+ E- --> HADRONS

E+ E- --> E+ E-

E+ E- --> MU+ MU-

UPSI(9460)

UPSI(10020)

UPSI(10350)

UPSI(10570)

CHI/B(10246)

BEAUTY

HIGGS

GLUEBALL

AXION

<EXPERIMENTAL COMMENT> FOR A DESCRIPTION OF THE APPARATUS, SEE THE LBL-91 SUPPLEMENT ON
DETECTORS.

<PUBLISHED PAPERS> PRL 44 (1980) 1111, PRL 45 (1980) 222, PRL 46 (1981) 1115, PRL 47
(1981) 771, PRL 48 (1982) 906, PR D26 (1982) 717, PR D26 (1982) 720, PL 114B (1982) 277,
NP B206 (1982) 1, PRL 49 (1982) 1612, PRL 49 (1982) 1616, AND PL 118B (1982) 453.

EXPERIMENT NAME OR NUMBER (DATE OF PROPOSAL)
AND PROGRESS DATES

TITLE

INSTITUTIONS AND PARTICIPANTS. THE ASTERISK
WITH "SPOKESPERSON" MEANS THE SUMMARY
WAS CHECKED AND UPDATED BY HIM/HER

ACCELERATOR AND DETECTOR

MAIN REACTIONS AND MOMENTA OR ENERGIES

PARTICLES STUDIED

COMMENTS

JOURNAL PAPERS FROM EXPERIMENT

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R. Frosch

SIN, Swiss Institute for Nuclear Research, CH-5234 Villigen, Switzerland

A. Olin

TRIUMF, 4004 Wesbrook Mall, Vancouver BC V6T 2A3, Canada

Abstract -- This report contains summaries of 479 approved experiments in elementary particle physics (experiments that finished taking data before 1 January 1979 are excluded). There are experiments from Brookhaven, CERN, CESR, DESY, Fermilab, Tokyo Institute of Nuclear Studies, KEK, LAMPF, Serpukhov, SIN, SLAC, and TRIUMF, and also experiments on proton decay. Properties of the beams at most of the laboratories are summarized.

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*The Berkeley Particle Data Group is supported by the Director, Office of Energy Research, Office of High Energy and Nuclear Physics, Division of High Energy Physics of the U.S. Department of Energy under Contract No. DE-AC03-76SF00098, and by the U.S. National Science Foundation under Agreement No. PHY-8022530.

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INTRODUCTION

The microfiche at the back of this report contains summaries of 479 approved experiments in elementary particle physics. Experiments that finished taking data before 1 January 1979 are not included here but are available on a computer database (see p. 3). An example from the summaries is given on the inside front cover. Experiments at the following laboratories are included:

Brookhaven (BNL)	KEK
CERN	LAMPF
CESR	Serpukhov (SERP)
DESY	SIN
Fermilab (FNAL)	SLAC
Institute for Nuclear Studies, Tokyo (INS)	TRIUMF

There are also summaries of proton decay experiments (P-DECAY). A list of all the experiments with their titles begins on p. 4.

New features in this edition -- (1) CESR, LAMPF, SIN, TRIUMF, and P-DECAY experiments appear for the first time. (2) Preliminary versions of the summaries of experiments at Brookhaven, CERN, CESR, DESY, Fermilab, Tokyo Institute of Nuclear Studies, KEK, and SLAC were sent to spokespersons for checking and updating. If a reply was received (which occurred for 68% of these experiments), there is an asterisk by "spokesperson" in the summary. (3) Spokespersons were asked to list journal articles (if any) published from their experiments. The summaries on the microfiche include these lists. (4) There is a new supplement to LBL-91, entitled "Major Detectors in Elementary Particle Physics," in which 40 detectors are described in detail.

Guides to the microfiche -- There are four aids for finding particular experiments on the microfiche. One is the list of experiments and their titles already mentioned. The second is an index of initial-state particles and beam momenta, in order of increasing particle mass and momentum. The third is an index of spokespersons. Finally, the table of contents of "Major Detectors in Elementary Particle Physics" lists the experiments that use the detectors described therein.

Abbreviations -- To keep the summaries on the microfiche brief, abbreviations are used for kinematic variables, accelerators, journals, detectors, particles, and institutions. The abbreviations are usually obvious but are defined in the yellow pages at the center of the report.

Properties of particle beams -- Tables at the back of the report summarize the properties of beams for fixed-target experiments at Brookhaven, CERN, Fermilab, KEK, LAMPF, Serpukhov, SIN, SLAC, and TRIUMF.

Acknowledgments -- We thank P. Oddone (LBL) for encoding the proton decay experiments, G. Row (SLAC) for help with getting data from SLAC to LBL, D.R.O. Morrison (CERN) for permission to make extensive use of "Experiments at CERN in 1982," N. Baggett (BNL) for information on Brookhaven experiments, N. Gelfand (FNAL) for information on Fermilab experiments, C. Oram (TRIUMF) for a discussion about TRIUMF beams, and the approximately 300 spokespersons who

took the time to reply to our inquiries.

Comments and requests -- We invite comments pointing out omissions, obscurities, out-of-date information, and errors. Comments should be sent to:

Particle Data Group (50-308)
Attn: EXPERIMENTS
Lawrence Berkeley Laboratory
Berkeley, CA 94720
USA

Requests for copies from the Americas, Australasia, and the Far East should go to the above address, while those from other areas should go to:

CERN Scientific Information Service
CH-1211 Geneva 23
Switzerland

SEARCHING THE EXPERIMENTS DATABASE (if you already know how to use the SLAC/SPIRES system)

This report is produced from a computerized database maintained under the SLAC/SPIRES database management system. The database, named EXPERIMENTS, is updated periodically, and contains everything in this report as well as earlier experiments. In particular, Argonne (ANL) and Rutherford (RHEL) experiments from earlier editions of LBL-91 are present.

Anyone who is familiar with SLAC/SPIRES and has an existing account can access this database online. If you have an account but are unfamiliar with SPIRES, an extensive wall poster, "Guide to VM Spires," is available from the SLAC library. If you do not have an account and cannot find anyone who does (at main laboratories, ask at the library), please contact SLAC directly.

To access the database:

SELECT EXPERIMENTS

To determine what indices are available for searching:

SHOW INDEX

To see a random selection of terms in an index:

BROWSE <index-name>

(e.g., **BROWSE REACTION**)

To search for experiments satisfying a certain criterion:

FIND <index-name> <value>

To list basic bibliographic information for these experiments:

TYPE

To switch to a format with more information (e.g., reactions, citations):

CLEAR FORMAT

To switch back to the basic format (with only bibliographic information):

SET FORMAT QUICKLIST

Some sample searches:

FIND AUTHOR JONES AND DATE-APPROVED 1975

(short form: **FIN A JONES AND DA 1975**)

FIND TITLE J/PSI

(short form: **FIN T J/PSI**)

FIND REACTION "E+ E- ----> E+ E-" AND DATE-COMPLETED AFTER 1978

(short form: **FIN RE "E+ E- ----> E+ E-" AND DC AFTER 1978;**

note the quotes required before and after the reaction)

FIND ACCELERATOR CERN-ISR

(short form: **FIN ACC CERN-ISR**)

FIND DETECTOR PLUTO

(short form: **FIN DET PLUTO**)

FINAL-STATE-PARTICLE INDEX (CONT'D)

[illegible]

LIST OF EXPERIMENTS AND TITLES

EXPERIMENT

TITLE

CERN-PS-161	SEARCH FOR STRONGLY BOUND STATES OF THE ANTIPROTON-PROTON, ANTIPROTON-DEUTERON, AND ANTIPROTON-FEW-NUCLEON STATES
CERN-PS-162	STUDY OF THE STRUCTURE OF EXOTIC LIGHT NUCLEI PRODUCED AT THE PS
CERN-PS-163-1	SEARCH FOR NARROW BARYONIUM STATES NEAR THE ANTI-P P THRESHOLD
CERN-PS-163-2	MEASUREMENT OF THE PBAR-P EXCITATION FUNCTION
CERN-PS-164	THE INFLUENCE OF CHANNELLING ON ATOMIC AND NUCLEAR REACTION YIELDS
CERN-PS-165	MEASUREMENT OF THE K- P SCATTERING LENGTH AT THRESHOLD BY OBSERVATION OF KAONIC HYDROGEN X-RAYS FROM A CONDENSED TARGET
CERN-PS-166	SEARCH FOR SIGMA HYPERNUCLEAR STATES USING THE STRANGENESS EXCHANGE REACTIONS (K-, PI-) AND (K-, PI-)
CERN-PS-167	BACKGROUND CALIBRATION FOR A PROTON-LIFETIME DETECTOR
CERN-PS-168	TO TEST A PROTOTYPE OF A PROTON LIFETIME DETECTOR IN A NEUTRINO BEAM AT THE PS
CERN-PS-169	SEARCH FOR NEUTRINO OSCILLATIONS
CERN-PS-170	PRECISION MEASUREMENTS OF THE PROTON ELECTROMAGNETIC FORM FACTORS IN THE TIME-LIKE REGION AND VECTOR MESON SPECTROSCOPY
CERN-PS-171	A STUDY OF PBAR-P INTERACTIONS AT REST IN A H2 GAS TARGET AT LEAR
CERN-PS-172	PBAR-P TOTAL CROSS SECTIONS AND SPIN EFFECTS IN PBAR P $\rightarrow$ K+ K-, PI+ PI-, PBAR P ABOVE 200 MEV/C
CERN-PS-173	MEASUREMENT OF PBAR-P CROSS SECTIONS AT LOW PBAR MOMENTA
CERN-PS-174	PRECISION SURVEY OF X-RAYS FROM PBAR-P (PBAR-D) ATOMS USING THE INITIAL LEAR BEAM
CERN-PS-175	MEASUREMENT OF THE ANTIPROTONIC LYMAN AND BALMER X-RAYS OF PBAR-H AND PBAR-D ATOMS AT VERY LOW TARGET PRESSURES
CERN-PS-176	STUDY OF X-RAY AND GAMMA-RAY SPECTRA FROM ANTIPROTONIC ATOMS AT THE SLOWLY EXTRACTED ANTIPROTON BEAM OF LEAR
CERN-PS-177	A SEARCH FOR HEAVY HYPERNUCLEI AT LEAR
CERN-PS-178	ANTINEUTRON PRODUCTION AT LEAR
CERN-PS-179	STUDY OF THE INTERACTION OF LOW-ENERGY ANTIPROTONS WITH H(2), HE(3), HE(4), AND NE NUCLEI USING A STREAMER CHAMBER IN A MAGNETIC FIELD
CERN-PS-180	SEARCH FOR NEUTRINO OSCILLATIONS AT CERN PS USING BEBC
CERN-PS-181	CONTRIBUTION OF THE LARGEST OBSERVATION TO THE CERN NEUTRINO OSCILLATION PROGRAM
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CERN-PS-184	STUDY OF ANTIPROTON NUCLEUS INTERACTION WITH A HIGH RESOLUTION MAGNETIC SPECTROMETER
CERN-PS-185	STUDY OF THRESHOLD PRODUCTION OF PBAR P TO YBAR Y AT LEAR
CERN-PS-186	NUCLEAR EXCITATIONS BY ANTIPROTONS AND ANTIPROTONIC ATOMS
CERN-PS-187	A GOOD STATISTICS STUDY OF ANTIPROTON INTERACTIONS WITH NUCLEI
CERN-PS-188	MEASUREMENTS OF CHANNELLING RADIATION AND ITS POLARIZATION, X-RAY EXCITATION, TOGETHER WITH DEVIATIONS FROM LANDAU DISTRIBUTIONS
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CERN-R-704	CHARMIONUM SPECTROSCOPY AT THE ISR USING AN ANTIPROTON BEAM AND A HYDROGEN JET TARGET
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CERN-WA-021	HIGH ENERGY NU AND ANTI-NU INTERACTIONS IN BEBC FILLED WITH H2
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CERN-WA-042	AN EXPERIMENT ON THE STRONG INTERACTIONS AND RADIATIVE DECAYS OF HYPERONS
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CERN-WA-046	STUDY OF OMEGA- DECAYS AND OF THE SIGMA- $\rightarrow$ N E- NU DECAY MODE
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LIST OF EXPERIMENTS AND TITLES

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CERN-WA-064	CHANNELING RADIATION IN A SILICON CRYSTAL
CERN-WA-065	FURTHER STUDIES OF PROMPT NEUTRINO PRODUCTION IN 400 GEV PROTON NUCLEUS COLLISIONS
CERN-WA-066	FURTHER STUDY OF PROMPT NEUTRINO PRODUCTION IN PROTON-NUCLEUS COLLISIONS USING BEBC
CERN-WA-067	STUDY OF π^- -P INTERACTIONS AT 85 GEV/C LEADING TO $K^+K^-K^-$ IN THE FINAL STATE -- SEARCH FOR NEW STATES
CERN-WA-068	FURTHER STUDY OF PROMPT NEUTRINO PRODUCTION IN A PROTON BEAM DUMP EXPERIMENT
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CERN-WA-076	STUDY OF THE MESONS PRODUCED CENTRALLY IN THE REACTION $P + P \rightarrow P + P + X$ AND $PI^- + P \rightarrow PI^- + P + X$ AT 85 GEV/C
CERN-WA-077	SEARCH FOR DIRECT PRODUCTION OF GLUONIUM STATES IN HIGH PT PI^- -N COLLISIONS AT 350 GEV/C
CERN-CLEO	THE CLEO EXPERIMENT AT CES ³
CERN-CUSB	CUSB -- HIGH RESOLUTION CALORIMETER TO STUDY THE UPSILON SPECTROSCOPY AND B PHYSICS
DESY-ANGUS	A NEW DETECTOR FOR DORIS
DESY-CRYSTAL-BALL	A LARGE SOLID ANGLE NEUTRAL DETECTOR (THE CRYSTAL BALL)
DESY-LENA	PROPOSAL FOR MEASUREMENTS IN CONTINUATION OF DESY-147
DESY-PETRA-CELLO	PROPOSAL FOR A π PT MAGNETIC DETECTOR FOR PETRA -- CELLO
DESY-PETRA-JADE	JADE -- PROPOSAL FOR A COMPACT MAGNETIC DETECTOR AT PETRA
DESY-PETRA-MARK-J	A SIMPLE DETECTOR TO MEASURE E^-E^+ REACTIONS AT HIGH ENERGIES -- MARK J
DESY-PETRA-PLUTO	PROPOSAL FOR EXPERIMENTS AT PETRA WITH PLUTO
DESY-PETRA-PLU-2	A PROPOSAL TO STUDY GAMMA-GAMMA INTERACTIONS WITH THE DETECTOR PLUTO AT PETRA
DESY-PETRA-TASSO	PROPOSAL FOR A LARGE π MAGNETIC DETECTOR FOR PETRA -- TASSO
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FNAL-180	A STUDY OF ANTINEUTRINO INTERACTIONS IN THE FERMI LAB 15-FT BUBBLE CHAMBER, FILLED WITH HYDROGEN AND NEON
FNAL-253	NEUTRINO-NUCLEUS INTERACTIONS AT WAL
FNAL-258	A PROPOSAL TO MEASURE PARTICLES PRODUCED AT HIGH TRANSVERSE MOMENTUM BY PIONS
FNAL-272	A PROPOSAL TO MEASURE COHERENT DISSOCIATION OF PI^- , K^- , AND $PBAR$ INTO TWO-BODY SYSTEMS AT WAL ENERGIES
FNAL-326	A PROPOSAL TO MEASURE MUON PAIRS PRODUCED AT HIGH TRANSVERSE MOMENTUM BY PIONS
FNAL-356	STUDIES OF DEEP INELASTIC DIFFERENTIAL DISTRIBUTIONS AT HIGH ENERGIES FOR NEUTRINO AND ANTINEUTRINO BEAMS
FNAL-561	PRECISION MEASUREMENT OF $\Lambda_{B0} \rightarrow E^- \mu$ DECAY PARAMETERS
FNAL-380	STUDY OF PROPERTIES OF WEAK NEUTRAL CURRENTS IN THE INTERACTIONS OF A NARROW BAND NEUTRINO BEAM IN LIQUID NEON
FNAL-388	PROPOSAL TO STUDY NEUTRAL CURRENT NEUTRINO AND ANTI-NEUTRINO INTERACTIONS IN THE 15-FOOT BUBBLE CHAMBER USING THE EXTERNAL MUON IDENTIFIER AND A DICHROMATIC BEAM
FNAL-390	ANTINEUTRINO INTERACTIONS IN THE DEUTERIUM FILLED 15 FOOT BUBBLE CHAMBER
FNAL-400	CHARMED PARTICLE PRODUCTION BY NEUTRONS
FNAL-401	PHOTOPRODUCTION OF HIGH MASS TWO-BODY FINAL STATES
FNAL-458	PHOTOPRODUCTION EXPERIMENT AT FERMI LAB
FNAL-466	A PROPOSAL FOR THE STUDY OF HIGH-ENERGY REACTION MECHANISMS BY THE MEASUREMENT OF THE ANGULAR AND ENERGY DISTRIBUTION OF π^+ NUCLEUS RECOILING FROM COLLISIONS WITH 200-300 GEV PROTONS
FNAL-490	SEARCH FOR SHORT LIVED PARTICLES USING A HIGH RESOLUTION STREAMER CHAMBER
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FNAL-502	SEARCH FOR MONOPOLES ABOVE THE 15-FOOT BUBBLE CHAMBER
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LAMPF-402	A MEASUREMENT OF THE POLARIZATION TRANSFER COEFFICIENTS $D/T(0 \text{ DEG})$ AND $A'/T(0 \text{ DEG})$ IN THE REACTION $p p \rightarrow n x$ AT 800 MEV
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LAMPF-457	MEASUREMENT OF THE QUASI-FREE n AND p AND FREE p ANALYZING POWERS, 500-800 MEV
LAMPF-462	ANALYZING POWER AND DIFFERENTIAL CROSS SECTIONS FOR THE REACTIONS $p p \rightarrow d p^+$ AND $p d \rightarrow t p^+$ AT ABOUT 600 MEV AND 400 MEV
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LAMPF-504	MEASUREMENT OF THE TOTAL CROSS SECTION DIFFERENCE FOR PROTON-PROTON AND PROTON-NEUTRON SCATTERING IN PURE TRANSVERSE INITIAL SPIN STATES IN THE 400-800 MEV REGION
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LAMPF-634	MEASUREMENT OF PARITY VIOLATION IN THE p -NUCLEON TOTAL CROSS SECTIONS AT 800 MEV
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SERP-E-100	STUDY OF LARGE pt PARTICLE PRODUCTION IN p NUCLEON COLLISIONS AT 70 GEV
SERP-E-102	STUDY OF HYPERCHARGE EXCHANGE SCATTERING PROCESSES
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SERP-E-130	LIQUID ARGON DETECTOR FOR HADRONS AND GAMMAS
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SERP-E-148	STUDY OF EXCLUSIVE RESONANCE PRODUCTION IN RARE PROCESSES IN SIGMA-M
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SIN-R-71-08	PRECISION MEASUREMENT OF THE MUON MOMENTUM IN PION DECAY AT REST
SIN-R-71-12	DETERMINATION OF AN UPPER LIMIT OF THE MUON MASS FROM PION DECAY IN FLIGHT
SIN-R-72-02	EXPERIMENTS WITH NEUTRON BEAMS
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SIN-R-74-05	ELECTRON POLARIZATION IN MUON DECAY
SIN-R-75-07-2	MEASUREMENT OF THE P PARAMETER IN π^- P ELASTIC AND CHARGE EXCHANGE SCATTERING
SIN-R-77-01	STUDY OF ANGULAR CORRELATIONS IN THE REACTIONS $\pi^0(\mu^-)$, $\mu^0\pi^0$ (G.S.) AND $\pi^0(\mu^-)$, $\mu^0\pi^0$ (G.S.)
SIN-R-78-02	MEASUREMENT OF CROSS SECTIONS FOR THE PRODUCTION OF CHARGED PIONS BY 90 MEV PROTONS
SIN-R-78-05-8	MEASUREMENT OF THE AXZ PARAMETER IN THE REACTION $P \rightarrow \pi^+ D$
SIN-R-78-06	MEASUREMENT OF THE REACTION P (POLARIZED) P (POLARIZED) $\rightarrow \pi^+ D$ AT 580 MEV
SIN-R-78-13-1	STUDY OF THE RADIATIVE DECAY OF THE PION
SIN-R-78-15-1	MEASUREMENT OF THE 2P-2S ENERGY DIFFERENCE IN MUONIC HYDROGEN
SIN-R-78-18	DETERMINATION OF THE VECTOR ANALYZING POWER IN π^+ D SCATTERING
SIN-R-79-05	SPECIAL REACTION CHANNELS OF π^+ AND π^- ABSORPTION IN LIGHT NUCLEI
SIN-R-79-07	THE STUDY OF THE REACTION $\pi^+ D \rightarrow \pi^+ P$ WITH A VECTOR POLARIZED D TARGET
SIN-R-80-01	MEASUREMENT OF CROSS SECTIONS WITH A BEAM OF POLARIZED PROTONS AND A POLARIZED TARGET
SIN-R-80-11	SEARCH FOR ADMIXTURE OF HEAVY NEUTRINOS IN $\pi^+ \rightarrow \mu^+ \nu_\mu$ MUON DECAY
SIN-R-81-01	EXPERIMENTAL DETERMINATION OF THE STRONG INTERACTION SHIFT IN THE 2P-1S TRANSITION OF PIONIC HYDROGEN AND DEUTERIUM ATOMS
SIN-R-81-02	STUDY OF THE FORMATION OF MUONIC ATOMS IN LOW Z GASEOUS MATERIALS IN A CYCLOTRON TRAP
SIN-R-81-09	SEARCH FOR HEAVY NEUTRINOS IN $\pi^+ \rightarrow e^+ \nu_e$ MUON DECAY
SIN-R-82-01	SEARCH FOR AN ADMIXTURE OF HEAVY NEUTRINOS IN THE DECAY OF PIONS AT REST
SIN-R-82-03-1	MEASUREMENT OF THE LIFETIME OF THE 2S STATE OF MUONIC HELIUM AT GAS PRESSURES BELOW 1 ATM
SIN-R-82-06	SPIR TRANSFER PARAMETERS IN THE PROTON-PROTON INELASTIC CHANNELS
SIN-Z-75-02	PARITY VIOLATION IN P P SCATTERING
SIN-Z-80-01	PARITY VIOLATION IN P P SCATTERING
SLAC-BC-061	π^+ P INTERACTIONS USING THE LEAD-GLASS WALL
SLAC-BC-066	SEARCH FOR EXOTIC MESONS PRODUCED IN ANTIPROTON-NUCLEON INTERACTIONS
SLAC-BC-070	SEARCH FOR MANIFESTLY EXOTIC STATES WITH STRANGENESS IN PHOTON-DEUTERIUM INTERACTIONS AT 9 GEV/C
SLAC-BC-072	STUDY OF CHARM PHOTOPRODUCTION IN THE SHF EXPOSED TO A POLARIZED MONO-ENERGETIC BACKSCATTERED LASER BEAM OF 20 GEV PHOTONS
SLAC-BC-073	MEASUREMENT OF LIFETIME AND OTHER PROPERTIES OF CHARMED PARTICLES
SLAC-E-130	PRECISE MEASUREMENTS OF ASYMMETRIES IN DEEP INELASTIC SCATTERING OF POLARIZED ELECTRONS BY POLARIZED PROTONS AND BY POLARIZED DEUTERONS
SLAC-E-133	MEASUREMENT OF THE ELASTIC ELECTRON-NEUTRON CROSS SECTION AT HIGH Q^2
SLAC-E-135	COMPARISON OF K^- P AND K^+ P INTERACTIONS, AND A PROGRAMMATIC STUDY OF STRANGE QUARK SPECTROSCOPY
SLAC-E-136	ELASTIC ELECTRON-PROTON CROSS SECTIONS AT LARGE MOMENTUM TRANSFER
SLAC-E-137	SEARCH FOR LOW MASS, METASTABLE NEUTRAL PARTICLES AT SLAC
SLAC-PEP-002	SEARCH FOR HIGHLY IONIZING PARTICLES AT PEP
SLAC-PEP-004	A PEP FACILITY BASED ON THE TIME PROJECTION CHAMBER
SLAC-PEP-005	A GENERAL SURVEY OF PARTICLE PRODUCTION AT PEP
SLAC-PEP-006	A LEPTON TOTAL ENERGY DETECTOR AT PEP
SLAC-PEP-009	A PEP FORWARD DETECTOR FACILITY
SLAC-PEP-012	A HIGH RESOLUTION SPECTROMETER AT PEP
SLAC-PEP-014	A SEARCH FOR FREE QUARKS AT PEP
SLAC-PEP-020	DEPC AT PEP
SLAC-SP-024	A PROPOSAL FOR A LARGE SOLID ANGLE NEUTRAL DETECTOR FOR SPEAR 2 (THE CRYSTAL BALL)
SLAC-SP-029	STUDIES OF THE ECM = 3-8 GEV REGION USING THE MARK II DETECTOR AT SPEAR
SLAC-SP-030	A LARGE SOLID ANGLE NEUTRAL DETECTOR FOR SPEAR II (THE CRYSTAL BALL)
SLAC-SP-031	CHECKOUT OF MARK II DETECTOR AT SPEAR
SLAC-SP-032	STUDIES OF THE WEAK DECAYS OF D MESONS AT THE PSI(3770) RESONANCE
TRI-052	A NEW MEASUREMENT OF THE π^+ $\rightarrow e^+ \nu_e$ BRANCHING RATIO -- A TEST OF THE STANDARD MODEL
TRI-074	PROPOSAL TO MEASURE D_s , R_s AND R_s' IN P P SCATTERING, 700 TO 520 MEV
TRI-104	SEARCH FOR MUON-ELECTRON CONVERSION AT TRIUMF
TRI-121	TEST OF CHARGE-SYMMETRY IN μ^+ P SCATTERING
TRI-137	LIFETIME OF THE POSITIVE MUON
TRI-168-197	2S MUONIUM PRODUCTION FROM THIN FOILS
TRI-171	TEST OF T-INVARIANCE IN P P SCATTERING
TRI-174	SPIN DEPENDENCE OF THE $P \rightarrow \pi^+ \pi^-$ P N π^+ REACTION
TRI-176-134	MEASUREMENT OF THE PARAMETER α_1 IN THE MUON DECAY
TRI-181	MEASUREMENT OF THE π^+ STRONG INTERACTION SHIFT IN PIONIC HYDROGEN
TRI-185	PRECISE MEASUREMENT OF THE POLARIZATION PARAMETER α_1 : A SEARCH FOR THE EFFECTS OF A RIGHT-HANDED TANGH BOSON IN μ^+ DECAY
TRI-190	RADIATIVE POLARIZED NEUTRON CAPTURE ON PROTONS
TRI-192	MEASUREMENT OF THE PION PRODUCTION ASYMMETRIES FROM REACTION $P \rightarrow \pi^+ \pi^-$ DEUT π^+ WITH A POLARIZED PHOTON BEAM AT ENERGIES 400-520 MEV
TRI-205	TENSOR ANALYZING POWER IN PION DEUTERIUM SCATTERING
TRI-217	LOW ENERGY, ELECTROMAGNETIC PION FORM FACTORS

BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
GAMMA P	<1.3	INS-15-2	NUMU NUCLEUS	0.	FNAL-594
GAMMA P	<200.0	CERN-WA-014	NUMU NUCLEUS	0.	CERN-WA-018
GAMMA P	0.5	INS-15-1	NUMU NUCLEUS	0.5	CERN-PS-181
GAMMA P	0.5	INS-14-3	NUMU NUCLEUS	0.5	CERN-PS-180
GAMMA P	1.2	INS-17-1	NUMU NUCLEUS	5.0	SERP-E-111
GAMMA P	20.0	SLAC-BC-072	NUMU NUCLEUS	10.0	SERP-E-107
GAMMA P	20.0	SLAC-BC-073	NUMU NUCLEUS	10.0	CERN-WA-059
GAMMA P	20.0	CERN-WA-057	NUMU NUCLEUS	10.0	FNAL-531
GAMMA P	70.0	FNAL-516	NUMU NUCLEUS	10.0	FNAL-564
GAMMA P	70.0	CERN-WA-069	NUMU NUCLEUS	10.0	CERN-WA-047
GAMMA P	50.0	FNAL-612	NUMU NUCLEUS	10.0	FNAL-545
GAMMA P	>100.0	CERN-WA-024	NUMU NUCLEUS	10.0	FNAL-636
GAMMA N	0.5	INS-14-4	NUMU NUCLEUS	10.0	FNAL-632
GAMMA NUCLEON	10.0	CERN-WA-001	NUMU NUCLEUS	20.0	FNAL-652
GAMMA DEUT	<1.2	INS-12-3	NUMU NUCLEUS	25.0	CERN-WA-022
GAMMA DEUT	0.3	INS-16-1	NUMU NUCLEUS	25.0	FNAL-616
GAMMA DEUT	0.4	INS-15-3	NUMU NUCLEUS	>60.0	FNAL-553
GAMMA DE	<0.0	FNAL-501	NUMU NUCLEUS	65.0	CERN-WA-022
GAMMA NUCLEUS	0.	FNAL-458	NUMU NUCLEUS	200.0	CERN-WA-022
GAMMA NUCLEUS	0.2	INS-14-2	NUMU	?	FNAL-356
GAMMA NUCLEUS	0.2	INS-17-2	NUMU	0.	LAMPP-645
GAMMA NUCLEUS	0.2	INS-18-1	NUMU	0.	BNL-775
GAMMA NUCLEUS	0.2	INS-16-2	NUMU	0.	BNL-776
GAMMA NUCLEUS	0.2	INS-15-3	NUMU	6.0E-02	LAMPP-638
GAMMA NUCLEUS	0.7	INS-15-4	NUMU	0.5	CERN-PS-169
GAMMA NUCLEUS	1.2	CERN-WA-001	ANUMU E-	0.	BNL-734
GAMMA NUCLEUS	20.0	CERN-WA-058	ANUMU E-	0.	FNAL-380
GAMMA NUCLEUS	200.0	FNAL-687	ANUMU E-	0.	FNAL-594
			ANUMU E-	0.	CERN-WA-018
			ANUMU E-	10.0	FNAL-253
			ANUMU P	0.	BNL-734
			ANUMU P	0.	CERN-WA-021
			ANUMU P	0.	FNAL-180
			ANUMU P	0.	FNAL-594
			ANUMU P	0.	CERN-WA-001
			ANUMU P	0.	CERN-WA-025
			ANUMU P	2.0	SERP-E-045
			ANUMU P	28.0	FNAL-388
			ANUMU P	35.0	FNAL-388
			ANUMU P	50.0	FNAL-380
			ANUMU P	95.0	FNAL-388
			ANUMU P	131.0	FNAL-388
			ANUMU N	0.	BNL-734
			ANUMU N	0.	FNAL-180
			ANUMU N	0.	CERN-WA-025
			ANUMU NUCLEON	10.0	CERN-WA-001
			ANUMU DEUT	0.	FNAL-390
			ANUMU DEUT	0.	CERN-WA-001
			ANUMU DEUT	0.	CERN-WA-025
			ANUMU NE	10.	FNAL-646
			ANUMU NE	28.0	FNAL-388
			ANUMU NE	35.0	FNAL-388
			ANUMU NE	50.0	FNAL-380
			ANUMU NE	95.0	FNAL-388
			ANUMU NE	131.0	FNAL-388
			ANUMU AL	2.0	SERP-E-045
			ANUMU FE	0.	CERN-WA-001
			ANUMU FE	0.	CERN-WA-018
			ANUMU FE	2.0	SERP-E-045
			ANUMU NUCLEUS	0.	CERN-PS-167
			ANUMU NUCLEUS	0.	CERN-PS-168
			ANUMU NUCLEUS	0.	FNAL-594
			ANUMU NUCLEUS	0.	CERN-WA-018
			ANUMU NUCLEUS	20.0	SERP-E-111
			ANUMU NUCLEUS	10.0	SERP-E-107
			ANUMU NUCLEUS	10.0	CERN-WA-059
			ANUMU NUCLEUS	10.0	FNAL-531
			ANUMU NUCLEUS	10.0	FNAL-564
			ANUMU NUCLEUS	20.0	CERN-WA-017
			ANUMU NUCLEUS	10.0	FNAL-632
			ANUMU NUCLEUS	20.0	FNAL-652
			ANUMU NUCLEUS	25.0	FNAL-616
			ANUMU NUCLEUS	>60.0	FNAL-553
			ANUMU	?	FNAL-356
			ANUMU	0.	LAMPP-645
			ANUMU	6.0E-02	LAMPP-638
			NOTAU NE	10.0	FNAL-686
			NOTAU NUCLEUS	10.	FNAL-636
			NOTAU NE	10.0	FNAL-646
			E- P	?	SLAC-E-133
			E- P	6.4	SLAC-E-130
			E- P	14.0	SLAC-E-136
			E- P	10.2	SLAC-E-130
			E- P	21.0	SLAC-E-136
			E- P	22.6	SLAC-E-130
			E- N	28.4	SLAC-E-136
			E- N	?	SLAC-E-133
			E- DEUT	?	SLAC-E-133
			E- DEUT	6.4	SLAC-E-130
			E- DEUT	16.2	SLAC-E-130
			E- DEUT	22.6	SLAC-E-130
			E- NUCLEUS	20.0	SLAC-E-137
			E-	1.0	CERN-PS-188
			E-	5.0	CERN-WA-064

MOMENTUM RANGES FOR NEUTRINO AND ANTINEUTRINO BEAMS ARE NOT
DETERMINED SYSTEMATICALLY.

NU E	10.0	200.0	FNAL-646
NU E-	2.0E-02	5.1E-02	LAMPP-225
NU E-	10.0	100.0	FNAL-253
NU E-	10.0	200.0	FNAL-646
NU E	10.0	200.0	FNAL-646
NCE NUCLEUS	0.5	3.0	CERN-PS-180
NCE NUCLEUS	10.0	250.0	FNAL-636
NLE	0.	5.1E-02	LAMPP-645
ANUE E-	0.	230.0	FNAL-646
ANUE E-	10.0	100.0	FNAL-253
ANUE E-	10.0	200.0	FNAL-646
ANUE P	0.	5.1E-02	LAMPP-645
ANUE DEUT	4.0E-02	10.0	LAMPP-031
ANUE NE	0.	10.0	FNAL-646
ANUE AL	2.0	30.0	SERP-E-045
ANUE E-	0.	12.0	BNL-734
ANUE E-	0.	150.0	CERN-WA-021
ANUE E-	0.	200.0	CERN-WA-021
ANUE E-	0.	230.0	FNAL-594
ANUE E-	0.	260.0	CERN-WA-018
ANUE E-	2.0	30.0	SERP-E-045
ANUE E-	10.0	100.0	FNAL-253
ANUE P	0.	10.0	BNL-734
ANUE P	0.	12.0	BNL-734
ANUE P	0.	150.0	CERN-WA-021
ANUE P	0.	20.0	FNAL-053A
ANUE P	0.	260.0	CERN-WA-001
ANUE P	0.	260.0	CERN-WA-025
ANUE P	10.0	200.0	FNAL-545
ANUE P	28.0	43.0	FNAL-388
ANUE P	35.0	64.0	FNAL-388
ANUE P	50.0	150.0	FNAL-380
ANUE P	95.0	95.0	FNAL-388
ANUE P	131.0	143.0	FNAL-388
ANUMU N	0.	0.2	BNL-704
ANUMU N	0.	0.4	BNL-706
ANUMU N	0.	10.0	BNL-737
ANUMU N	0.	12.0	BNL-734
ANUMU N	0.	230.0	FNAL-594
ANUMU N	0.	260.0	CERN-WA-025
ANUMU N	2.0	30.0	SERP-E-045
ANUMU N	10.0	20.0	FNAL-545
ANUMU NUCLEON	10.0	200.0	FNAL-545
ANUMU NUCLEON	10.0	600.0	FNAL-646
ANUMU DEUT	0.	10.0	BNL-737
ANUMU DEUT	0.	260.0	CERN-WA-001
ANUMU DEUT	0.	260.0	CERN-WA-025
ANUMU C12	0.	0.2	BNL-704
ANUMU NE	0.	200.0	FNAL-053A
ANUMU NE	10.0	200.0	FNAL-646
ANUMU NE	28.0	43.0	FNAL-388
ANUMU NE	35.0	64.0	FNAL-388
ANUMU NE	50.0	150.0	FNAL-380
ANUMU NE	95.0	95.0	FNAL-388
ANUMU NE	131.0	143.0	FNAL-388
ANUMU AL	2.0	30.0	SERP-E-045
ANUMU FE	0.	260.0	CERN-WA-001
ANUMU FE	2.0	30.0	SERP-E-045
ANUMU FE	30.0	230.0	FNAL-701
ANUMU PB	0.	200.0	CERN-WA-044
ANUMU NUCLEUS	0.	6.0	CERN-PS-167
ANUMU NUCLEUS	0.	6.0	CERN-PS-168

BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET		LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
FOR E ⁺ E ⁻ COLLIDING BEAM EXPERIMENTS, WE GIVE THE CENTER-OF-MASS *LAB MOMENTA RATHER THAN THE EQUIVALENT LAB MOMENTUM FOR SCATTERING ON A STATIONARY TARGET.			
E ⁺ -E ⁻			SLAC-SP-031
E ⁺ -E ⁻		<30.0	KEK-TR-001
E ⁺ -E ⁻		<30.0	KEK-TR-002
E ⁺ -E ⁻	0.2		CERN-NA-007
E ⁺ -E ⁻	0.2		CERN-WA-007
E ⁺ -E ⁻	0.2		CERN-WA-007
E ⁺ -E ⁻	0.2		CERN-NA-007
E ⁺ -E ⁻	1.5	4.0	SLAC-SP-029
E ⁺ -E ⁻	1.5	4.2	SLAC-SP-028
E ⁺ -E ⁻	1.5	4.2	SLAC-SP-030
E ⁺ -E ⁻	1.5		SLAC-SP-032
E ⁺ -E ⁻	1.8		SLAC-SP-032
E ⁺ -E ⁻	1.9		SLAC-SP-032
E ⁺ -E ⁻	3.7	5.8	DESY-LEBA
E ⁺ -E ⁻	4.0	18.0	SLAC-PEP-002
E ⁺ -E ⁻	4.0	18.0	SLAC-PEP-004
E ⁺ -E ⁻	4.0	18.0	SLAC-PEP-004
E ⁺ -E ⁻	4.0	18.0	SLAC-PEP-006
E ⁺ -E ⁻	4.0	18.0	SLAC-PEP-012
E ⁺ -E ⁻	4.0	18.0	SLAC-PEP-020
E ⁺ -E ⁻	4.5	5.8	DESY-ANGUS
E ⁺ -E ⁻	4.5	8.0	CFR-CLIO
E ⁺ -E ⁻	4.7	5.8	CFR-CUSB
E ⁺ -E ⁻	4.7		DESY-CRYSTAL-B
E ⁺ -E ⁻	5.0	20.0	DESY-PETRA-CEL
E ⁺ -E ⁻	5.0	20.0	DESY-PETRA-JAD
E ⁺ -E ⁻	5.0	20.0	DESY-PETRA-MAR
E ⁺ -E ⁻	5.0	20.0	DESY-PETRA-TAS
E ⁺ -E ⁻	5.0		DESY-CRYSTAL-B
E ⁺ -E ⁻	6.0	15.0	SLAC-PEP-005
E ⁺ -E ⁻	6.0	16.0	DESY-PETRA-FLU
E ⁺ -E ⁻	14.5		SLAC-PEP-014
E ⁺ -E ⁻	17.5		DESY-PETRA-PLU
E ⁺ -E ⁻	1.0	10.0	CERN-PS-188
E ⁺ -E ⁻	4.0	20.0	CERN-WA-064
MU ⁺ -P			SIN-87-75-15-1
MU ⁺ -P	1.0	280.0	CERN-NA-002
MU ⁺ -P	120.0	280.0	CERN-NA-009
MU ⁺ -HE	0.		BNL-784
MU ⁺ -HE	0.		SIN-87-02-1
MU ⁺ -C12	6.5E-02		SIN-87-77-01
MU ⁺ -FE	60.0		FNAL-640
MU ⁺ -NUCLEUS	0.		LAMPF-084
MU ⁺ -NUCLEUS	0.		LAMPF-421
MU ⁺ -NUCLEUS	0.		TRI-104
MU ⁺ -NUCLEUS	0.2		SIN-87-81-02
MU ⁺ -NUCLEUS	100.0	280.0	CEPH-NA-004
MU ⁺ -AL	?		TPI-168-107
MU ⁺ -FE	0.1		BNL-754
MU ⁺ -FE	60.0		FNAL-640
MU ⁺ -	0.		LAMPF-031
MU ⁺ -	0.		LAMPF-400-445
MU ⁺ -	0.		LAMPF-444
MU ⁺ -	0.		LAMPF-455
MU ⁺ -	0.		TRI-137
MU ⁺ -	0.		TRI-176-134
MU ⁺ -	3.0E-02		TRI-155
MU ⁺ -	0.1		SIN-87-74-05
MUON P	75.0		FNAL-665
MUON NUCLEUS	280.0		CERN-NA-028
MUON NUCLEUS	325.0		CERN-NA-028
MUON NUCLEUS	75.0		FNAL-665
PION E	20.0		CERN-NA-007
PION E	300.0		CERN-NA-007
PION NUCLEUS	350.0		CERN-NA-019
PI ⁺ -P	7.7E-02		LAMPF-38R
PI ⁺ -P	8.7E-02		LAMPF-38R
PI ⁺ -P	0.6E-02		LAMPF-38R
PI ⁺ -P	0.1		LAMPF-38R
PI ⁺ -P	0.1		LAMPF-38R
PI ⁺ -P	0.1		LAMPF-38R
PI ⁺ -P	0.2		LAMPF-38R
PI ⁺ -P	0.3	0.5	CERN-SC-093
PI ⁺ -P	0.4	0.7	LAMPF-364
PI ⁺ -P	0.7		LAMPF-056-120
PI ⁺ -P	1.5	1.5	CERN-PS-160
PI ⁺ -P	2	14.0	CERN-PS-157
PI ⁺ -P	5.0	20.0	SERP-E-102
PI ⁺ -P	16.0		SLAC-BC-067
PI ⁺ -P	20.0		CERN-WA-056
PI ⁺ -P	50.0	200.0	CERN-WA-006
PI ⁺ -P	85.0		CERN-WA-076
PI ⁺ -P	100.0		FNAL-577
PI ⁺ -P	100.0		FNAL-507
PI ⁺ -P	100.0	300.0	CERN-NA-008
PI ⁺ -P	100.0	350.0	CERN-NA-024
PI ⁺ -P	14.0		FNAL-570
PI ⁺ -P	200.0		CERN-WA-070
PI ⁺ -P	200.0		FNAL-577
PI ⁺ -P	260.0		CERN-NA-022

[illegible]

SEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GEV/C)	EXPERIMENT
PI- P	0.1	LAMPF-388	PI- HG	360.0	FNAL-597
PI- P	0.1	SIN-R-81-01	PI- SI	200.0	CERN-WA-032
PI- P	0.1	LAMPF-388	PI- CU	20.0	SERP-E-148
PI- P	0.2	SIN-R-75-07-2	PI- CU	30.0	SERP-E-148
PI- P	0.2	LAMPF-058-120	PI- CU	40.0	SERP-E-148
PI- P	0.3	CERN-SC-094	PI- CU	225.0	FNAL-326
PI- P	0.3	LAMPF-337	PI- SN	225.0	FNAL-326
PI- P	0.3	LAMPF-337	PI- WT	225.0	FNAL-326
PI- P	0.4	LAMPF-363	PI- AU	100.0	FNAL-597
PI- P	0.7	LAMPF-058-120	PI- AU	360.0	FNAL-597
PI- P	1.1	SERP-E-092	PI- PB	100.0	CERN-WA-020
PI- P	2.0	CERN-PS-157	PI- NUCLEUS		KEK-C82
PI- P	5.0	CERN-PS-153	PI- NUCLEUS	0.8	BNL-602
PI- P	4.0	SERP-E-091	PI- NUCLEUS	1.0	SERP-E-127
PI- P	8.0	BNL-771	PI- NUCLEUS	20.0	SERP-E-148
PI- P	8.0	BNL-755	PI- NUCLEUS	20.0	CERN-WA-035
PI- P	12.0	CERN-WA-056	PI- NUCLEUS	30.0	CERN-WA-072
PI- P	13.0	BNL-726	PI- NUCLEUS	30.0	SERP-E-148
PI- P	13.0	BNL-732	PI- NUCLEUS	40.0	SERP-E-143
PI- P	13.0	SERP-E-115	PI- NUCLEUS	40.0	SERP-E-148
PI- P	20.0	BNL-705	PI- NUCLEUS	40.0	SERP-E-135
PI- P	20.0	CERN-WA-007	PI- NUCLEUS	75.0	FNAL-616
PI- P	20.0	SERP-E-144	PI- NUCLEUS	100.0	CERN-WA-010
PI- P	20.0	SERP-E-105	PI- NUCLEUS	100.0	FNAL-258
PI- P	21.0	BNL-769	PI- NUCLEUS	125.0	FNAL-537
PI- P	22.0	BNL-747	PI- NUCLEUS	150.0	CERN-WA-003
PI- P	25.0	SERP-E-116	PI- NUCLEUS	160.0	FNAL-272
PI- P	25.0	SERP-E-134	PI- NUCLEUS	200.0	CERN-WA-003
PI- P	30.0	SERP-E-148	PI- NUCLEUS	200.0	FNAL-490
PI- P	33.0	SERP-E-142	PI- NUCLEUS	200.0	FNAL-515
PI- P	40.0	CERN-WA-007	PI- NUCLEUS	200.0	FNAL-665
PI- P	40.0	SERP-E-112	PI- NUCLEUS	250.0	FNAL-615
PI- P	40.0	SERP-E-116	PI- NUCLEUS	280.0	CERN-WA-003
PI- P	40.0	SERP-E-147	PI- NUCLEUS	300.0	CERN-WA-017
PI- P	40.0	SERP-E-148	PI- NUCLEUS	300.0	FNAL-272
PI- P	40.0	SERP-E-135	PI- NUCLEUS	300.0	FNAL-605
PI- P	60.0	CERN-WA-007	PI- NUCLEUS	300.0	CERN-WA-015
PI- P	80.0	CERN-WA-007	PI- NUCLEUS	300.0	CERN-WA-015
PI- P	80.0	CERN-WA-067	PI- NUCLEUS	300.0	CERN-WA-015
PI- P	100.0	FNAL-577	PI- NUCLEUS	300.0	CERN-WA-015
PI- P	100.0	FNAL-607	PI- NUCLEUS	300.0	CERN-WA-015
PI- P	100.0	CERN-WA-024	PI- NUCLEUS	300.0	FNAL-663
PI- P	100.0	FNAL-258	PI- NUCLEUS	300.0	FNAL-672
PI- P	140.0	CERN-WA-011	PI- NUCLEUS	300.0	SERP-E-134
PI- P	140.0	FNAL-570	PI- NUCLEUS	300.0	SIN-R-75-15-1
PI- P	140.0	CERN-WA-005	PI- NUCLEUS	300.0	SIN-R-82-03-1
PI- P	150.0	CERN-WA-008	PI- NUCLEUS	300.0	CERN-PS-188
PI- P	175.0	FNAL-663	PI- NUCLEUS	300.0	CERN-PS-164
PI- P	200.0	CERN-WA-070	PI- NUCLEUS	300.0	SERP-E-134
PI- P	200.0	FNAL-577	PI- NUCLEUS	300.0	SERP-E-146
PI- P	200.0	FNAL-590	PI- NUCLEUS	300.0	SERP-E-140
PI- P	300.0	CERN-WA-005	PI- NUCLEUS	300.0	SERP-E-134
PI- P	300.0	CERN-WA-012	PI- NUCLEUS	300.0	SERP-E-134
PI- P	300.0	CERN-WA-070	PI- NUCLEUS	300.0	SERP-E-148
PI- P	300.0	FNAL-623	PI- NUCLEUS	300.0	SERP-E-142
PI- P	360.0	CERN-WA-013	PI- NUCLEUS	300.0	SERP-E-142
PI- P	360.0	CERN-WA-016	PI- NUCLEUS	300.0	SERP-E-148
PI- P	360.0	CERN-WA-027	PI- NUCLEUS	300.0	SERP-E-148
PI- P	360.0	FNAL-597	PI- NUCLEUS	300.0	DESY-CRYSTAL-BAL
PI- P	450.0	CERN-WA-070	PI- NUCLEUS	300.0	DESY-CRYSTAL-BAL
PI- DEUT	7.75-32	LAMPF-388	PI- NUCLEUS	300.0	CERN-WA-055
PI- DEUT	8.75-32	LAMPF-388	PI- NUCLEUS	300.0	SERP-E-133
PI- DEUT	0.5E-02	LAMPF-285	PI- NUCLEUS	300.0	CERN-WA-027
PI- DEUT	0.6E-02	LAMPF-388	PI- NUCLEUS	300.0	FNAL-577
PI- DEUT	0.1	LAMPF-388	PI- NUCLEUS	300.0	FNAL-597
PI- DEUT	0.1	LAMPF-388	PI- NUCLEUS	300.0	FNAL-670
PI- DEUT	0.1	LAMPF-388	PI- NUCLEUS	300.0	FNAL-577
PI- DEUT	0.1	SIN-R-81-01	PI- NUCLEUS	300.0	CERN-WA-022
PI- DEUT	0.1	LAMPF-388	PI- NUCLEUS	300.0	KEK-024
PI- DEUT	0.2	LAMPF-478	PI- NUCLEUS	300.0	KEK-034
PI- DEUT	0.3	LAMPF-680	PI- NUCLEUS	300.0	KEK-034
PI- DEUT	0.3	LAMPF-581	PI- NUCLEUS	300.0	KEK-034
PI- DEUT	0.4	LAMPF-368	PI- NUCLEUS	300.0	SERP-E-091
PI- DEUT	0.4	KEK-083	PI- NUCLEUS	300.0	SERP-E-102
PI- DEUT	0.4	LAMPF-368	PI- NUCLEUS	300.0	FNAL-588
PI- DEUT	0.5	CERN-PS-150	PI- NUCLEUS	300.0	FNAL-588
PI- DEUT	1.0	SERP-E-091	PI- DEUT	300.0	KEK-081
PI- DEUT	5.0	FNAL-704	PI- DEUT	300.0	SERP-E-091
PI- DEUT	200.0	SIN-R-75-05	PI- DEUT	300.0	FNAL-597
PI- DEUT	0.2	LAMPF-546	PI- DEUT	300.0	BNL-602
PI- DEUT	0.3	LAMPF-546	PI- DEUT	300.0	CERN-WA-035
PI- TRIT	0.2	LAMPF-546	PI- DEUT	300.0	CERN-WA-061
PI- TRIT	0.3	LAMPF-546	PI- DEUT	300.0	CERN-WA-022
PI- HE	100.0	CERN-WA-011	PI- DEUT	300.0	FNAL-672
PI- BE	200.0	FNAL-567	PI- DEUT	300.0	KEK-090
PI- BE	225.0	FNAL-610	PI- DEUT	300.0	KEK-089
PI- BE	225.0	FNAL-326	PI- DEUT	300.0	KEK-110
PI- BE	275.0	FNAL-650	PI- DEUT	300.0	CERN-PS-164
PI- BE	350.0	CERN-WA-077	PI- DEUT	300.0	BNL-735
PI- C	530.0	FNAL-705	PI- DEUT	300.0	BNL-777
PI- NE	30.0	CERN-WA-051	PI- DEUT	300.0	BNL-740
PI- JE	60.0	CERN-WA-051	PI- DEUT	300.0	
PI- MG	100.0	FNAL-597	PI- DEUT	300.0	

BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE -GEV/C	EXPERIMENT
KS	50.0	FNAL-621
KS	450.0	CERN-WA-031
KL	0.	BNL-646
KL	70.0	BNL-617
KL	50.0	FNAL-533
KL	50.0	FNAL-621
KL	450.0	CERN-WA-031
K- P	0.	CERN-PS-165
K- P	0.7	BNL-702
K- P	0.7	BNL-750
K- P	2.2	BNL-n09
K- P	3.2	BNL-693
K- P	4.0	BNL-673
K- P	4.6	BNL-603
K- P	4.7	CERN-PS-157
K- P	5.0	BNL-673
K- P	5.0	SERP-E-061
K- P	6.0	BNL-777
K- P	5.0	CERN-WA-074
K- P	11.0	SLAC-E-126
F- P	17.0	CERN-WA-046
K- P	17.0	SERP-E-110
K- P	18.4	CERN-WA-070
K- P	20.0	CERN-WA-007
K- P	20.0	SERP-E-148
K- P	22.0	BNL-707
K- P	25.0	SERP-E-116
K- P	35.0	SERP-E-105
K- P	33.0	SERP-E-112
K- P	40.0	CERN-WA-005
K- P	40.0	SERP-E-112
K- P	40.0	SERP-E-116
K- P	46.0	SERP-E-148
K- P	46.0	SERP-E-134
K- F	60.0	CERN-WA-007
K- P	75.0	FNAL-565
K- P	80.0	CERN-WA-007
K- F	100.0	FNAL-577
K- P	100.0	FNAL-646
K- P	105.0	CERN-WA-028
K- P	160.0	FNAL-646
K- P	175.0	FNAL-663
K- P	200.0	FNAL-677
DEUT	1.0	CERN-PS-159
DEUT	20.0	SERP-E-201
K- HE	0.7	BNL-774
K- LI6	0.7	BNL-740
K- C	0.7	BNL-740
K- O	0.7	BNL-740
K- IR	0.7	BNL-751
K- NUCLEUS	0.5	CERN-S-166
K- NUCLEUS	0.6	BNL-646
K- NUCLEUS	0.6	BNL-646
K- NUCLEUS	0.6	BNL-601
K- NUCLEUS	0.6	BNL-465
K- NUCLEUS	0.6	BNL-760
K- NUCLEUS	1.0	SERP-E-127
K- NUCLEUS	20.0	CERN-WA-035
K- NUCLEUS	40.0	SERP-E-126
K- NUCLEUS	70.0	CERN-WA-061
K- NUCLEUS	75.0	SLAC-272
K- NUCLEUS	200.0	FNAL-566
K- NUCLEUS	300.0	FNAL-272
K- NUCLEUS	500.0	FNAL-672
K- NUCLEUS	?	SERP-E-115
KAON E-	20.0	CERN-PS-164
KAON E-	300.0	CERN-WA-007
KAON E-	300.0	CERN-WA-007
MESON(UNSPEC)	?	SERP-E-08
PROTON-PROTON COLLIDING BEAM EXPERIMENTS AT THE CERN ISR		
PERFORMED BY THE EQUIVALENT LAB MOMENTUM FOR SCATTERING ON A		
STATIONARY TARGET RATHER THAN BY THE ACTUAL LAB CENTER-OF-MASS		
MOMENTUM		
P P	0.3	SIN-2478-72
P P	0.6	TRI-074
P P	0.7	TRI-171
P P	0.8	SIN-R-71-07
P P	0.8	SIN-R-80-01
P P	0.8	LAMPF-408
P P	0.8	LAMPF-504
P P	0.9	KEK-057
P P	0.9	TRI-174
P P	1.0	TRI-192
P P	1.0	LAMPF-508
P P	1.0	TRI-174
P P	1.0	TRI-192
P P	1.0	SIN-R-78-06
P P	1.0	SIN-R-82-05
P P	1.0	TRI-192
P P	1.1	TRI-174
P P	1.1	TRI-192
P P	1.1	LAMPF-336
P P	1.1	LAMPF-392
P P	1.1	LAMPF-517
P P	1.1	LAMPF-563

PROTON-PROTON COLLIDING BEAM EXPERIMENTS AT THE CERN-ISR ARE ORDERED BY THE EQUIVALENT LAB MOMENTUM FOR SCATTERING ON A STATIONARY TARGET RATHER THAN BY THE ACTUAL LAB (CENTER-OF-MASS) MOMENTUM.

BEAM AND TARGET	LAB. MOMENTUM OR MOMENTUM RANGE (GeV/c)	EXPERIMENT
F-P	1.1	F-1-1-42
F-P	1.1	LAMF-F-14
F-P	1.1	LAMF-F-17
F-P	1.1	F-1-17
F-P	1.1	F-1-122
F-P	1.2	SIN-F-7-76-4
F-P	1.2	LAMF-F-50
F-P	1.2	LAMF-F-51
F-P	1.2	LAMF-F-16
F-P	1.2	LAMF-F-17
F-P	1.2	LAMF-F-18
F-P	1.2	LAMF-F-19
F-P	1.2	LAMF-F-20
F-P	1.2	LAMF-F-21
F-P	1.2	LAMF-F-22
F-P	1.2	LAMF-F-23
F-P	1.2	LAMF-F-24
F-P	1.2	LAMF-F-25
F-P	1.2	LAMF-F-26
F-P	1.2	LAMF-F-27
F-P	1.2	LAMF-F-28
F-P	1.2	LAMF-F-29
F-P	1.2	LAMF-F-30
F-P	1.2	LAMF-F-31
F-P	1.2	LAMF-F-32
F-P	1.2	LAMF-F-33
F-P	1.2	LAMF-F-34
F-P	1.2	LAMF-F-35
F-P	1.2	LAMF-F-36
F-P	1.2	LAMF-F-37
F-P	1.2	LAMF-F-38
F-P	1.2	LAMF-F-39
F-P	1.2	LAMF-F-40
F-P	1.2	LAMF-F-41
F-P	1.2	LAMF-F-42
F-P	1.2	LAMF-F-43
F-P	1.2	LAMF-F-44
F-P	1.2	LAMF-F-45
F-P	1.2	LAMF-F-46
F-P	1.2	LAMF-F-47
F-P	1.2	LAMF-F-48
F-P	1.2	LAMF-F-49
F-P	1.2	LAMF-F-50
F-P	1.2	LAMF-F-51
F-P	1.2	LAMF-F-52
F-P	1.2	LAMF-F-53
F-P	1.2	LAMF-F-54
F-P	1.2	LAMF-F-55
F-P	1.2	LAMF-F-56
F-P	1.2	LAMF-F-57
F-P	1.2	LAMF-F-58
F-P	1.2	LAMF-F-59
F-P	1.2	LAMF-F-60
F-P	1.2	LAMF-F-61
F-P	1.2	LAMF-F-62
F-P	1.2	LAMF-F-63
F-P	1.2	LAMF-F-64
F-P	1.2	LAMF-F-65
F-P	1.2	LAMF-F-66
F-P	1.2	LAMF-F-67
F-P	1.2	LAMF-F-68
F-P	1.2	LAMF-F-69
F-P	1.2	LAMF-F-70
F-P	1.2	LAMF-F-71
F-P	1.2	LAMF-F-72
F-P	1.2	LAMF-F-73
F-P	1.2	LAMF-F-74
F-P	1.2	LAMF-F-75
F-P	1.2	LAMF-F-76
F-P	1.2	LAMF-F-77
F-P	1.2	LAMF-F-78
F-P	1.2	LAMF-F-79
F-P	1.2	LAMF-F-80
F-P	1.2	LAMF-F-81
F-P	1.2	LAMF-F-82
F-P	1.2	LAMF-F-83
F-P	1.2	LAMF-F-84
F-P	1.2	LAMF-F-85
F-P	1.2	LAMF-F-86
F-P	1.2	LAMF-F-87
F-P	1.2	LAMF-F-88
F-P	1.2	LAMF-F-89
F-P	1.2	LAMF-F-90
F-P	1.2	LAMF-F-91
F-P	1.2	LAMF-F-92
F-P	1.2	LAMF-F-93
F-P	1.2	LAMF-F-94
F-P	1.2	LAMF-F-95
F-P	1.2	LAMF-F-96
F-P	1.2	LAMF-F-97
F-P	1.2	LAMF-F-98
F-P	1.2	LAMF-F-99
F-P	1.2	LAMF-F-100
F-P	1.2	LAMF-F-101
F-P	1.2	LAMF-F-102
F-P	1.2	LAMF-F-103
F-P	1.2	LAMF-F-104
F-P	1.2	LAMF-F-105
F-P	1.2	LAMF-F-106
F-P	1.2	LAMF-F-107
F-P	1.2	LAMF-F-108
F-P	1.2	LAMF-F-109
F-P	1.2	LAMF-F-110
F-P	1.2	LAMF-F-111
F-P	1.2	LAMF-F-112
F-P	1.2	LAMF-F-113
F-P	1.2	LAMF-F-114
F-P	1.2	LAMF-F-115
F-P	1.2	LAMF-F-116
F-P	1.2	LAMF-F-117
F-P	1.2	LAMF-F-118
F-P	1.2	LAMF-F-119
F-P	1.2	LAMF-F-120
F-P	1.2	LAMF-F-121
F-P	1.2	LAMF-F-122
F-P	1.2	LAMF-F-123
F-P	1.2	LAMF-F-124
F-P	1.2	LAMF-F-125
F-P	1.2	LAMF-F-126
F-P	1.2	LAMF-F-127
F-P	1.2	LAMF-F-128
F-P	1.2	LAMF-F-129
F-P	1.2	LAMF-F-130
F-P	1.2	LAMF-F-131
F-P	1.2	LAMF-F-132
F-P	1.2	LAMF-F-133
F-P	1.2	LAMF-F-134
F-P	1.2	LAMF-F-135
F-P	1.2	LAMF-F-136
F-P	1.2	LAMF-F-137
F-P	1.2	LAMF-F-138
F-P	1.2	LAMF-F-139
F-P	1.2	LAMF-F-140

BEAM-TARGET-MOMENTUM INDEX

BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GeV/c)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM OR MOMENTUM RANGE (GeV/c)	EXPERIMENT
P F	2047.5	CERN-R-608	P NUCLEUS	450.0	CERN-WA-068
P P	2067.4	CERN-R-607	P NUCLEUS	500.0	FNAL-576
P P	2074.0	CERN-R-105	P NUCLEUS	500.0	FNAL-672
P P	2114.1	CERN-R-420	P NUCLEUS	750.0	FNAL-508
P P	1.6E+05	CERN-R-703	P NUCLEUS	800.0	FNAL-557
P N	<70.0	SERP-E-110	P NUCLEUS	1000.0	FNAL-672
P N	0.8	LAMPF-504	P WATER	30.0	BNL-739
P N	1.1	LAMPF-392	P	1.0	CERN-PS-182
P N	1.2	LAMPF-500	P	2.0	CERN-PS-164
P N	1.3	KEK-075	N P	0.	CERN-WA-006
P N	1.4	KEK-075	N P	0.6	SIN-R-72-02
P N	1.5	LAMPF-385	N P	0.6	TRI-190
P N	1.5	LAMPF-392	N P	1.0	LAMPF-406
P N	1.5	LAMPF-457	N P	1.1	LAMPF-665
P N	1.5	LAMPF-500	N P	1.1	LAMPF-683
P N	1.6	KEK-075	N P	1.1	TFT-121
P N	1.8	KEK-075	N P	1.1	LAMPF-492
P N	32.0	SERP-E-150	N P	1.2	LAMPF-500
P NUCLEON	1.5	LAMPF-634	N P	1.2	LAMPF-066
P DEUT	1.0	LAMPF-498	N P	1.3	LAMPF-498
P DEUT	1.1	LAMPF-634	N P	1.3	LAMPF-665
P DEUT	1.1	LAMPF-664	N P	1.3	LAMPF-683
P DEUT	1.3	LAMPF-585	N P	1.5	LAMPF-366
P DEUT	1.3	LAMPF-635	N P	1.5	LAMPF-403
P DEUT	1.3	LAMPF-664	N P	1.5	LAMPF-492
F DEUT	1.5	LAMPF-385	N P	1.5	LAMPF-590
F DEUT	1.5	LAMPF-015	N P	1.5	LAMPF-498
P DEUT	1.5	LAMPF-360	N P	1.5	LAMPF-589
F DEUT	1.5	LAMPF-462	N P	1.5	LAMPF-665
P DEUT	1.5	LAMPF-634	N P	1.5	LAMPF-683
P DEUT	1.5	LAMPF-664	N P	1.5	BNL-766
P DEUT	20.0	BNL-717	N DEUT	1.0	SIN-R-72-02
P DEUT	24.0	BNL-717	N C	45.0	SERP-E-104
P DEUT	32.0	SERP-E-150	N SL	280.0	FNAL-400
P DEUT	70.0	SERP-E-100	N NUCLEUS	40.0	SERP-E-146
P DEUT	300.0	FNAL-705	N NUCLEUS	300.0	FNAL-630
P HE	3.3	SIN-2.50-01	N	1.4E-04	LAMPF-647
P HE	1.5	LAMPF-715	AN P	0.1	BNL-767
P HE	72.1	CERN-J-210	AN NUCLEUS	0.	CERN-PS-179
P HE	117.7	CERN-R-110	AP P	0.	CERN-PS-170
P HE	480.8	CERN-R-418	AP F	0.	CERN-PS-171
P HE	1036.5	CERN-R-418	AP P	0.	CERN-PS-174
P BE	1.5	LAMPF-360	AP P	0.	CERN-PS-175
P BE	24.0	BNL-744	AP P	0.	CERN-PS-182
P BE	100.0	CERN-NA-011	AP P	0.	CERN-PS-183
P BE	270.0	FNAL-673	AP P	0.	CERN-PS-183
P BE	400.0	CERN-NA-020	AP F	0.	CERN-PS-161
P BE	400.0	FNAL-555	AP P	0.	BNL-708
P C	400.0	FNAL-706	AP P	0.	CERN-PS-179
P C	530.0	FNAL-706	AP P	0.	CERN-PS-170
P C	800.0	FNAL-706	AP P	0.2	CERN-PS-173
P C12	1.5	LAMPF-641	AP P	0.2	CERN-PS-172
P HD	100.0	FNAL-507	AP P	0.3	CERN-PS-172
P AR	200.0	CERN-NA-005	AP P	0.3	CERN-PS-178
P CR	500.0	FNAL-524	AP P	0.3	BNL-762
P CU	400.0	CERN-NA-020	AP P	0.4	KEK-033
P CU	400.0	CERN-WA-054	AP P	0.4	BNL-742
P AG	500.0	FNAL-524	AP P	0.4	BNL-730
P XE	200.0	CERN-NA-005	AP P	0.4	BNL-738
P WT	500.0	FNAL-524	AP P	0.4	CERN-PS-163-2
P AU	100.0	FNAL-507	AP P	0.5	KEK-074
P AU	400.0	CERN-NA-030	AP P	0.5	BNL-701
P U	20.0	CERN-PS-162	AP P	0.7	BNL-701
P NUCLEUS	?	KEK-084	AP P	0.8	CERN-PS-163-1
P NUCLEUS	<13.0	KEK-082	AP P	0.9	BNL-701
P NUCLEUS	1.0	SERP-E-127	AP P	1.5	CERN-PS-165
P NUCLEUS	1.0	BNL-778	AP P	3.0	KEK-062
P NUCLEUS	1.2	SIN-R-76-02	AP P	3.5	KEK-062
P NUCLEUS	4.0	KEK-045	AP P	7.5	CERN-WA-704
P NUCLEUS	13.0	KEK-066	AP P	4.0	KEK-062
P NUCLEUS	20.0	CERN-WA-C35	AP P	4.5	KEK-062
P NUCLEUS	20.0	FNAL-501	AP P	6.1	SLAC-BC-068
P NUCLEUS	70.0	SERP-E-120	AP P	7.0	BNL-771
P NUCLEUS	70.0	SERP-E-121	AP P	8.0	CERN-WA-074
P NUCLEUS	70.0	SERP-E-144	AP P	8.9	SLAC-BC-068
P NUCLEUS	200.0	FNAL-565	AP P	12.0	CERN-WA-049
P NUCLEUS	200.0	FNAL-628	AP P	13.0	SERP-E-116
P NUCLEUS	200.0	FNAL-464	AP P	20.0	CERN-WA-007
P NUCLEUS	240.0	CERN-WA-046	AP P	20.0	SERP-E-148
P NUCLEUS	250.0	CERN-NA-022	AP P	25.0	SERP-E-116
P NUCLEUS	300.0	FNAL-505	AP P	30.0	SERP-E-148
P NUCLEUS	400.0	CERN-WA-038	AP P	32.0	SERP-E-132
P NUCLEUS	400.0	CERN-WA-052	AP P	32.0	SERP-E-150
P NUCLEUS	400.0	CERN-WA-065	AP P	40.0	CERN-WA-007
P NUCLEUS	400.0	CERN-WA-066	AP P	40.0	SERP-E-116
P NUCLEUS	400.0	FNAL-497	AP P	40.0	SERP-E-148
P NUCLEUS	400.0	FNAL-549	AP P	60.0	CERN-WA-007
P NUCLEUS	400.0	FNAL-557	AP P	74.0	CERN-WA-082
P NUCLEUS	400.0	FNAL-565	AP P	80.0	CERN-WA-007
P NUCLEUS	400.0	FNAL-605	AP P	100.0	CERN-NA-021
P NUCLEUS	400.0	FNAL-608	AP P	100.0	FNAL-577
P NUCLEUS	400.0	FNAL-613	AP P	100.0	FNAL-547
P NUCLEUS	400.0	FNAL-631	AP P	137.0	CERN-WA-042
P NUCLEUS	400.0	FNAL-622	AP P	157.0	FNAL-577
P NUCLEUS	450.0	CERN-NA-031	AP P	174.0	FNAL-663

BEAM AND TARGET	LAB MOMENTUM M (OR MOMENTUM RANGE) (GeV/c)	EXPERIMENT	BEAM AND TARGET	LAB MOMENTUM M (OR MOMENTUM RANGE) (GeV/c)	EXPERIMENT
AP P	200.0	CERN-WA-006	AP	2.0	CERN-PS-164
AP P	200.0	FNAL-577	LAMBDA P	30.0	SERP-E-120
AP P	200.0	FNAL-704	LAMBDA LEUT	30.0	SERP-E-120
AP P	212.2	CERN-R-420	LAMBDA NUCLEUS	30.0	FNAL-616
AP P	268.6	CERN-UA-06	LAMBDA	?	KEK-049
AP P	268.3	CERN-R-210	LAMBDA	30.0	FNAL-261
AP P	400.0	CERN-WA-070	SIGMA+ P	60.0	SERP-E-120
AP P	478.7	CERN-R-421	SIGMA+ DEUT	30.0	SERP-E-120
AP P	478.7	CERN-P-608	SIGMA+	?	KEK-092
AP P	478.7	CERN-R-110	SIGMA-	120.0	FNAL-620
AP P	2047.4	CERN-R-211	SIGMA+ P	30.0	SERP-E-120
AP P	478.7	CERN-R-601	SIGMA+ P	74.0	CERN-WA-042
AP P	478.7	CERN-R-608	SIGMA+ F	137.0	CERN-WA-042
AP P	511.2	2047.4	SIGMA+ DEUT	30.0	SERP-E-120
AP T	1030.7	CERN-R-421	SIGMA+ DEUT	74.0	CERN-WA-042
AP P	1400.0	CERN-R-420	SIGMA+ DEUT	137.0	CERN-WA-042
AP P	1400.0	CERN-R-608	SIGMA- BF	137.0	CERN-WA-062
AP P	2047.5	CERN-R-421	SIGMA+ NUCLEUS	?	BNL-721
AP P	2047.5	CERN-R-608	SIGMA+ NUCLEUS	1.0	KEF-E-127
AP P	2114.1	CERN-R-420	SIGMA+ NUCLEUS	30.0	FNAL-626
AP P	5328.0	CERN-UA-08	SIGMA-	120.0	CERN-WA-046
AP P	4706.2	CERN-710	SIGMA-	120.0	FNAL-620
AP P	4706.2	FNAL-712	SIGMA-	200.0	FNAL-714
AP P	1.3E-05	FNAL-CDX	X10 F	30.0	SERP-E-120
AP P	1.6E-05	CERN-R-702	X10 LEUT	30.0	SERP-E-120
AP P	1.6E-05	CERN-UA-01	X1- P	30.0	SERP-E-150
AP P	1.6E-05	CERN-UA-02	X1- P	74.0	CERN-WA-042
AP P	1.6E-05	CERN-UA-03	X1- P	137.0	CERN-WA-042
AP P	1.6E-05	CERN-UA-05	X1- LEUT	30.0	SERP-E-120
AP N	9.0	SLAC-BE-070	X1- DEUT	74.0	CERN-WA-042
AP N	37.0	SERP-E-100	X1- DEUT	137.0	CERN-WA-042
AP DEUT	0.	CERN-PS-174	X1-	120.0	FNAL-620
AP DEUT	0.	CERN-PS-175	OMEGA- P	30.0	SERP-E-120
AP DEUT	0.	CERN-PS-161	OMEGA- DEUT	30.0	SERP-E-120
AP DEUT	0.	BNL-772	OMEGA-	120.0	CERN-WA-046
AP DEUT	0.	CERN-PS-179	OMEGA-	120.0	FNAL-620
AP DEUT	0.5	BNL-701	OMEGA-	137.0	CERN-WA-046
AP DEUT	0.7	BNL-701	DEUT F	1.5	LANF-E-484
AP DEUT	0.8	CERN-PS-163-1	LEUT P	30.0	KEK-C60
AP DEUT	0.9	BNL-701	LEUT HER	30.0	KEK-730-2
AP NUCLEUS	6.1	SLAC-BE-068	LEUT	30.0	CERN-WA-033
AP DEUT	6.9	SLAC-BE-068	AEUT P	120.0	SERP-E-139
AP DEUT	37.0	SERP-E-160	AEUT LEUT	120.0	SERP-E-139
AP DEUT	74.0	CERN-WA-042	AEUT	30.0	CERN-WA-033
AP DEUT	137.0	CERN-WA-042	HE3	30.0	CERN-WA-033
AP DEUT	300.0	FNAL-705	HE37	30.0	CERN-WA-033
AP HE3	0.	CERN-PS-179	TRIT	30.0	CERN-WA-033
AP HE	0.	CERN-PS-179	ATRIU	30.0	CERN-WA-033
AP HE	0.	CERN-PS-179	HE HE	70.2	CERN-R-210
AP HG	100.0	FNAL-587	HE HE	116.0	CERN-R-110
AP AR	0.	CERN-PS-179	HE HE	174.0	CERN-R-009
AP AR	200.0	CERN-WA-005	HE HE	126.1	CERN-R-207
AP YE	200.0	CERN-WA-005	HE HE	2001.7	CERN-R-418
AP AU	100.0	FNAL-597	HE HE	4.0	CERN-WA-033
AP NUCLEUS	0.	HE	HE	37.0	CERN-WA-033
AP NUCLEUS	0.	CERN-PS-176	BOR12	6.5E-92	SIN-R-77-011
AP NUCLEUS	0.	CERN-PS-186	LONGLIVED	5.0	CERN-WA-033
AP NUCLEUS	0.	CERN-PS-186	HADRON P	200.0	2000.0
AP NUCLEUS	0.	CERN-PS-161	HADRON P	360.0	CERN-WA-026
AP NUCLEUS	0.	CERN-PS-197	HADRON NUCLEUS	30.0	CERN-WA-018
AP NUCLEUS	0.3	CERN-PS-184	CHARGE+ P	30.0	CERN-WA-063
AP NUCLEUS	20.0	CERN-WA-035	CHARGE+	1.0	SERP-E-132
AP NUCLEUS	70.0	CERN-WA-061	CHARGE+	30.0	200.0
AP NUCLEUS	125.0	FNAL-537	CHARGE+	40.0	CERN-WA-063
AP NUCLEUS	150.0	FNAL-272	CHARGE+	10.0	SERP-E-132
AP NUCLEUS	300.0	FNAL-272	CHARGE+	50.0	200.0
AP NUCLEUS	500.0	FNAL-672	NEUTRAL	?	FNAL-684

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SMIRNOV, V.M.	LENI	SERP-E-127	WOLF, G.	DESY	DESY-PETRA-TASSO
SMITH, G.	KARL	SIN-R-78-18	WOLTER, W.	CRAC	FNAL-508
SMITH, G.	KARL	SIN-R-79-07	WOTSCHACK, J.	CERN	CERN-PS-169
SMITH, G.A.	MSU	CERN-PS-183	YANAHOTO, S.S.	TOKY	KEK-087
SMITH, G.A.	MSU	BNL-767	YAMAZAKI, T.	TOKY	KEK-080
SMITH, G.A.	MSU	BNL-762	YOKOSAWA, A.	ANL	FNAL-704
SMOLYANKIN, V.T.	ITEP	SERP-E-120	YOSHIMURA, Y.	KEK	KEK-062
SNOW, G.A.	UND	FNAL-648	YUAN, V.	ILL	LAMPP-634
SOBER, D.F.	CATH	LAMPP-058-120	ZAKHAR, A.	ETHZ	SIN-R-77-01
SOKOLOVSKY, V.V.	ITEP	SERP-E-147	ZELLER, M.E.	YALE	BNL-777
SOUDER, P.A.	YALE	LAMPP-421	ZEILER, M.E.	YALE	BNL-777
STANEK, R.	ANL	LAMPP-664	ZICHICH, A.	CERN	CERN-R-422
STEINBERGER, J.	CERN	CERN-WA-001	ZICHICH, A.	CERN	CERN-WA-044
STEINBERGER, J.	CERN	CERN-WA-066	ZICHICH, A.	CERN	CERN-R-421
STEINBERGER, J.	CERN	CERN-WA-054	ZIOCK, K.O.H.	VIRG	SIN-R-80-11
STREIT, K.P.	HEID	CERN-WA-062	ZIOCK, K.O.H.	VIRG	LAMPP-100
STROVINE, K.	UCB, LBL	TRI-184	ZOLIN, L.S.	JINR	SERP-E-121
STRUB, R.	STRB	CERN-WA-046	ZUPANCIC, C.	MPIM	CERN-NA-004
SUGARMAN, N.	CHIC	FNAL-466			

ABBREVIATIONS USED ON THE MICROFILMS

JOURNALS

Following are abbreviations for journals listed in the summaries:

AJP	American Journal of Physics
ANNP	Annals of Physics
BAPS	Bulletin of the American Physical Society
HPA	Helvetica Physica Acta
IEEE TNS	Institute of Electrical and Electronics Engineers Transactions in Nuclear Science
JASA	Journal of the Acoustical Society of America
JETPL	JETP Letters (translation of ZETFP)
JPSJ	Journal of the Physical Society of Japan
LNC	Lettere al Nuovo Cimento
NIM	Nuclear Instruments and Methods
NP	Nuclear Physics
PL	Physics Letters
PR	Physical Review
PREP	Physics Reports (Physics Letters C)
PRL	Physical Review Letters
PS	Physica Scripta
SJNP	Soviet Journal of Nuclear Physics (translation of YF)
YF	Yadernaya Fizika (translated as SJNP)
ZETFP	Pis'ma v Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki (translated as JETPL)
ZPHY	Zeitschrift für Physik

KINEMATIC VARIABLES

The following abbreviations are used with reactions to indicate the momenta or energies at which they are studied:

PLAB	beam momentum in the lab frame
TLAB	beam kinetic energy in the lab frame
ECM	total energy in the c.m. frame
Q2	absolute value of the 4-momentum transfer

ACCELERATORS

BNL	Brookhaven (AGS) Proton Synchrotron (31 GeV/c Plab)
CERN	CERN (PS) Proton Synchrotron (28 GeV/c Plab)
CERN-ISR	CERN Proton-Proton ISR (62 GeV/c Plab)
CERN-PBAR/P	CERN Proton-Antiproton Collider (540 GeV/c Plab)
CERN-SC	CERN Synchro-Cyclotron (600 MeV/c Plab)
CERN-SPS	CERN Super Proton Synchrotron (450 GeV/c Plab)
CESR	Cornell Positron-Electron Storage Ring (16 GeV/c Plab)
DESY	Deutsches Electron Synchrotron (7.5 GeV/c Plab)
DESY-DORIS	DESY Positron-Electron Ring (11.6 GeV/c Plab)
DESY-PETRA	DESY Positron-Electron Colliding Beams (40 GeV/c Plab)
FNAL	FNAL Proton Synchrotron (500 GeV/c Plab)
FNAL-TeV	FNAL Tevatron (2000 GeV/c Plab)
KEK	KEK Proton Synchrotron (13 GeV/c Plab)
KEK-TRISTAN	KEK Positron-Electron Ring (60 GeV/c Plab)
LAMPF	Los Alamos Meson/Proton Factory (1460 MeV/c Plab)
SERP	IHEP Serpukhov Proton Synchrotron (76 GeV/c Plab)
SIN	Schweizerisches Inst. für Nuklearforschung (590 MeV/c Plab)
SLAC	Stanford Electron Linear Accelerator (33 GeV/c Plab)
SLAC-PEP	SLAC Positron-Electron Project (36 GeV/c Plab)
SLAC-SPEAR	SLAC Positron-Electron Ring (8.4 GeV/c Plab)
TOKY	INS Tokyo Electron Synchrotron (1.3 GeV/c Plab)
TRIUMF	Canadian Triangle Universities Meson Facility (520 MeV/c Plab)

DETECTORS

For bubble chambers we use a construction such as:

DBC-2M

or

HBC-15FT-HYB

or

HLBC-BEBC-TST.

The first element, one of

HBC

DBC

HEBC

HLBC.

tells whether the chamber fill is hydrogen, deuterium, helium, or heavy liquid. The second element gives the size or name of the chamber. Where appropriate, a third element, one of

HYB

RAP

TST.

indicates that the chamber is part of a hybrid system, or that it is rapid cycling, or that it contains a track-sensitive target.

For non-bubble-chamber detectors, general abbreviations are:

CALO	calorimeter
CNTR	counters (no chambers)
COMB	combinations of different types of detectors, no particular one dominant
DAS	double arm spectrometer
EMUL	emulsion
OSPK	optical spark chambers
OTTIER	rare non-electronic detectors (e.g., moon, ocean floor)
PHOTON	photon spectrometer
PLASTIC	lexan or other such material in which tracks are frozen (except emulsion)
SAS	single arm spectrometer
SPEC	general spectrometer
STRC	streamer chamber
WIRE:	wire chambers, (proportional wire chambers, drift chambers, etc.); includes all non-optical spark chambers by convention
WAS	wide angle spectrometer

DETECTORS (CONT'D)

Acronyms for specific detectors:

AFS	CERN-ISR axial field spectrometer
ARGUS	DESY-DORIS detector system
CCS	FNAL Chicago cyclotron spectrometer
CDF	FNAL-TEV Collider detector
CDHS	CERN-Dortmund-Heidelberg-Saclay neutrino detector (WAI)
CELLO	DESY-PETRA spectrometer system
CHARM	CERN-Hamburg-Amsterdam-Rome-Moscow-neutrino detector
CLEO	CESR spectrometer
CRYBOX	LAMPF crystal array detector
CRY-SBALL	SLAC-SPEAR and DESY-DORIS large solid angle neutral detector
CUSB	CESR high resolution calorimeter
DELCO	SLAC-SPEAR and PEP detector system
EHS	European hybrid spectrometer at CERN-SPS
EMS	CERN-SPS European muon collaboration detector
EPICS	LAMPF energetic pion spectrometer and detection system
FMPS	Fermilab multiparticle spectrometer
GAMS	gamma spectrometer at Serpukhov
HPW	Harvard-Penn-Wisconsin neutrino detector at BNL
HRS	SLAC-PEP high resolution spectrometer
JADE	DESY-PETRA spectrometer system
JANUS	LAMPF proton polarimeter
LAB-E	FNAL target-calorimeter muon-spectrometer detector for neutrino physics
LAHRS	LAMPF high resolution proton spectrometer
LASS	SLAC large aperture solenoid spectrometer
LENA	DESY-DORIS detector system
MAC	SLAC-PEP magnetic calorimeter
MARK-II	SLAC-SPEAR and PEP spectrometer system
MARK-III	SLAC-SPEAR spectrometer system (not related to MARK-II)
MARK-J	DESY-PETRA spectrometer system
MPS	BNL multiparticle spectrometer
MPS-II	upgraded BNL MPS
OMEGA	CERN OMEGA spectrometer
OMEGAPRIME	upgraded CERN OMEGA spectrometer
PLUTO	DESY-DORIS and PETRA superconducting solenoid spectrometer
RMS	Rutherford multiparticle spectrometer, now at CERN
SFM	CERN-ISR split field magnet
SIGMA	CERN-IHEP magnetic spectrometer at Serpukhov
SSF	SLAC spectrometer facility -- 1.6, 8, and/or 20 GeV
SUPERBENKEI	KEK superconducting magnetic spectrometer
TASSO	DESY-PETRA spectrometer system
TELAS	KEK target-embodied large-aperture spectrometer
TOPAZ	KEK-TRISTAN solenoidal spectrometer with TPC
TPC	SLAC-PEP time projection chamber
UA1	CERN-PBAR/P detector
UA2	CERN-PBAR/P detector
VENUS	KEK-TRISTAN spectrometer
2-GAMMA	SLAC-PEP detector to study 2-gamma process

PARTICLE VOCABULARY

ABARYON			unspecified antibaryon
ACHARM			particle with negative charm
ADEUT			antideuteron
AD0			charmed meson ($C = 1$)
AG			silver nucleus
AHE			anti-helium-4 nucleus
AHE3			anti-helium-3 nucleus
AK0			$S = 1$ K0
AK*(UNSPEC)0			unspecified $S = 1$ neutral K*
AL			aluminum nucleus
ALAMBDA			antilambda
AN			antineutron
ANNIHIL			pure annihilation final state in nucleon-antineutron scattering
ANU			antineutrino
ANUCLEON			antineutron
ANUCLEUS			general antinucleus
ANUE			electron antineutrino
ANUMU			muon antineutrino
ANUTAU			tau antineutrino
ANYTHING			
AP			antiproton
AQUARK(1/3)			antiquark
AQUARK(2/3)			antiquark
AR			argon nucleus
ASIGMA0	ASIGMA +	ASIGMA	antisigma
ASTRANGE			unspecified $S = +1$ particle
ATRIT			anti-tritium nucleus
AU			gold nucleus
AXION			hypothesized light Higgs scalar boson
AXI0	AXI +		anti-xi
A+			baryon with quark content usc
A0			baryon with quark content dsc
A1(1270)0	A1(1270) +	A1(1270)	
A2(1320)0	A2(1320) +	A2(1320)	
A3(1680)0	A3(1680) +	A3(1680)	
BARYON			unspecified baryon
BARYONIUM			meson coupling mainly to baryon-antibaryon
BE			beryllium nucleus
BEAUTY			particle with nonzero beauty (or bottom)
BOR12			boron-12
B(1235)0	B(1235) +	B(1235)	
B(5200)			meson with beauty
C			carbon nucleus
CA			calcium nucleus
CD			cadmium nucleus
CENTAUR0			final state with 50 or more charged particles, no pions
CHARGED			charged particle
CHARGED+			positive charged particle

PARTICLE VOCABULARY (CONT'D)

CHARGED			negative charged particle
CHARM			unspecified particle with charm
CHARMEI>BARYON			unspecified baryon with charm
CHI(UNSPEC)0			unspecified radiative decay product of psi(3685)
CHI(3510)			radiative decay product of psi(3685)
CHI(3550)			radiative decay product of psi(3685)
CHI/B(10246)			radiative decay product of high mass upsilons
CHI/B(UNSPEC)			unspecified radiative decay product of high mass upsilons
CR			chromium nucleus
CU			copper nucleus
C12			carbon-12 nucleus
C*(4.44)			4.44 keV excited state of carbon
DD			diffraction dissociation; followed by particles so produced, e.g. DD -> P P10 -
DELTA(980)0	DELTA(980) +	DELTA(980)	
DEL			DEL(1232P33)
DEL0			DEL(1232P33)0
DEL +			DEL(1232P33) +
DEL -			DEL(1232P33) -
DEL(UNSPEC)0			unspecified $I = 3/2$ baryon
DEL(UNSPEC) +			unspecified $I = 3/2$ baryon
DEMON			exotic-3 diquark deuteron-like state
DEUT			deuteron
DIBARYON			unspecified $S = 0$ dibaryon resonance
DIHYPERON			unspecified $S = -2$ dihyperon resonance
D0			charmed meson
D +			charmed meson
D			charmed meson
D*(2010)			charmed meson
D*(2010) +			charmed meson
D*(2010) -			charmed meson
D(UNSPEC) +			unspecified charmed meson
D(1285)			
EPSILON			pi-pi S-wave
ETA			
ETAPRIME			recurrence of the eta
ETAPRIME - C			recurrence of the eta - c
ETA,C			lowest mass $J^P = 0^-$ charmonium state
EXOTIC-MESON			cannot be formed of quark-antiquark
EXOTIC-NUCLEON			cannot be formed of three quarks
E +			positron
E -			electron or positron
E			electron
F(1420)			
F			F(1270) meson resonance
FI			iron nucleus
FPRIME			
FRAG			nuclear fragment

PARTICLE VOCABULARY (CONT'D)

PARTICLE VOCABULARY (CONT'D)

FI(1540)0 FI(1540)+ FI(1540)-
 F+ charmed strange meson
 F- charmed strange meson
 GAMMA any photon
 GLUEBALL
 GLUON
 HADRON unspecified hadron
 HADRON+ positive hadron
 HADRON- negative hadron
 HE helium-4 nucleus
 HE3 helium 3
 HIGGS Higgs boson
 HYPERNUC hypernucleus
 HVY-LEPTON general heavy lepton
 HVY-NEUTRINO heavy neutrino
 HVY-NUE
 HVY-NUMU
 H(2040) I=0, JP=4+ meson resonance
 INELASTIC same as ANYTHING, except elastic excluded
 IR iridium nucleus
 JET jet detected as a whole
 J/PSI
 KAON unspecified kaon or antikaon
 KL K long
 KS K short
 K0 K+
 K-
 K*(UNSPEC) unspecified K*
 K*(UNSPEC)0 unspecified K*
 K*(892)0 K*(892)+ K*(892)-
 K*(1430)0 K*(1430)+ K*(1430)-
 LAMBDA
 LAMBDA/C+ charmed baryon
 LAM(UNSPEC) I=0, S=-1 baryon
 LAM(1330B) unverified bump at 1330 MeV
 LAM(1520D03)
 LEPTON unspecified lepton
 Li6 Li7 lithium nuclei
 LONGLIVED stable under strong or electromagnetic decay;
 mass and other quantum numbers not specified
 MESON unspecified meson
 MESON(UNSPEC)0 unspecified neutral meson
 MESON(UNSPEC)+ unspecified charge +1 meson
 MESON(UNSPEC)- unspecified charge -1 meson
 MG magnesium nucleus
 MONOPOLE magnetic monopole
 MUON mu+ or mu-
 MU+ Mu+
 N neutron

NE neon nucleus
 NEUTRAL neutral particle
 NIT12 nitrogen-12 nucleus
 NNBAR(2020)0 nucleon-antinucleon state
 NNBAR(2300)0 nucleon-antinucleon state
 NU neutrino
 NUCLEON nucleon
 NUCLEUS general nucleus
 NUE electron neutrino
 NUMU muon neutrino
 NUTAU tau neutrino
 N*5/2(UNSPEC) unspecified I=5/2, S=0 baryon
 N*(UNSPEC)0 unspecified S=0 baryon
 N*(UNSPEC)+ unspecified S=0 baryon
 N(UNSPEC)0 unspecified I=1/2, S=0 baryon
 N(UNSPEC)+ unspecified I=1/2, S=0 baryon
 N(1520D13)0 N(1520D13)+
 N(1675D15)0 N(1675D15)+
 O oxygen nucleus
 OMEGA meson resonance
 OMEGA- S=-3 baryon
 OMEGA*(UNSPEC) unspecified S=-3 baryon resonance
 OMEGA*(UNSPEC)- unspecified S=-3 baryon resonance
 P proton
 PB lead nucleus
 PHI
 PHIPRIME recurrence of the phi
 PION pion of unspecified charge
 PI0
 PI+ charged pion
 PI-
 PI-
 PRONG a charged prong
 PSI(UNSPEC) unspecified JP=1- charmonium state
 PSI(3685)
 PSI(3770)
 QUARK unspecified quark
 QUARK(1/3) quark
 QUARK(2/3) quark
 RHO0 RHO+ RHO-
 RHOPRIME(1550)0 RHOPRIME(1550)+ RHOPRIME(1550)-
 SI silicon nucleus
 SIGMA0 SIGMA+ SIGMA-
 SIGMA/C+ I=1 charmed baryon
 SIG(UNSPEC)0 unspecified I=1, S=-1 particle
 SIG(UNSPEC)+ unspecified I=1, S=-1 particle
 SIG(UNSPEC)- unspecified I=1, S=-1 particle
 SIG(1385P13)0 SIG(1385P13)+ SIG(1385P13)
 SN tin nucleus

PARTICLE VOCABULARY (CONT'D)

STRANGE	unspecified strange particle
STRANGEONUM	meson whose quark content is dominantly s-sbar, such as the phi
S+	intermediate scalar boson
S-	intermediate scalar boson
S*(975)	pi-pi or K-Kbar S-wave
S(1935)0	S(1935) + S(1935)
TACHYON	
TAU	heavy lepton
TAU+	positive heavy lepton
TAU-	negative heavy lepton
TOPONIUM	top-antitop state
TRIT	tritium nucleus
TRUTH	particle with nonzero truth (or top)
U	uranium nucleus
UNSPEC	particle of unspecified type
UPSI(UNSPEC)	unspecified upslon particle
UPSI(9460)	
UPSI(10020)	
UPSI(10350)	
UPSI(10570)	
VEE	unspecified neutral strange particle decay
VMESON	unspecified vector meson
VMESON0	unspecified vector meson
WATER	
WT	tungsten nucleus -- note name is not same as chemical symbol
W0	intermediate vector boson
W+	intermediate vector boson
W-	intermediate vector boson
XE	xenon nucleus
XI0 XI-	
XI*(UNSPEC)0	unspecified S = 2 baryon
XI*(UNSPEC)-	unspecified S = 2 baryon
XI(UNSPEC)0	unspecified I = 1/2, S = 2 baryon
XI(UNSPEC)-	unspecified I = 1/2, S = 2 baryon
XI(1530P13)0 XI(1530)-	
XI(1820)0 XI(1820)-	
XI(1940)0 XI(1940)-	
Y0	neutral strange particle
Y*(UNSPEC)0	unspecified S = 1 baryon
Y*(UNSPEC)+	unspecified S = 1 baryon
Y*(UNSPEC)-	unspecified S = 1 baryon
Z0	neutral weak gauge boson
Z*(UNSPEC)0	unspecified exotic S = -1 baryon

INSTITUTIONS

AACH	Phys. Inst. der Tech. Hochschule	Aachen, Germany
AARH	Aarhus Univ.	Aarhus, Denmark
ABAD	Abadan Inst. of Technology	Abadan, Iran
ABLC	Abilene Christian Univ.	Abilene, TX, USA
AICH	Aichi Educational Univ.	Toyota, Aichi Pref., Japan
AKIT	Akita Univ.	Akita, Japan
ALBA	State Univ. of New York at Albany	Albany, NY, USA
ALBE	Alberta Univ., NRC	Edmonton, Alb., Canada
ALMA	Kazakh Inst. for High Energy Physics	Alma-Ata, USSR
AMER	American Univ.	Washington, DC, USA
AMES	Ames Lab	Ames, Iowa, USA
AMST	Univ. of Amsterdam	Amsterdam, Netherlands
ANIK	Amsterdam Nikhef	Amsterdam, Netherlands
ANL	Argonne Nat. Lab.	Argonne, Ill., USA
ANPL	Athens Univ., Nucl. Phys. Lab.	Athens, Greece
ARIZ	Univ. of Arizona	Tucson, Ariz., USA
ATEN	Nuclear Res. Centre Demokritos	Athens, Greece
AUCK	Auckland Univ.	Auckland, New Zealand
BARI	Univ. di Bari	Bari, Italy
BASL	Basel Univ.	Basel, Switzerland
BEDF	Bedford College	London, England
BELG	Inst. Interuniv. des Sci. Nuclear	Bruxelles, Belgium
BERG	Fysisk Institut	Bergen, Norway
BERL	Inst. Hochenergiephys. DAW	Zeuthen/Berlin, DDR
BERN	Univ. Bern	Bern, Switzerland
BGNA	Univ. di Bologna	Bologna, Italy
BHEP	Inst. of High Energy Physics	Beijing, China
BIEL	Univ. Bielefeld	Bielefeld, Germany
BIRK	Birkbeck College	London, England
BIRM	Birmingham Univ.	Birmingham, England
BLOO	Bloomsburg State Coll	Bloomsburg, PA, USA
BNL	Brookhaven National Lab	Upton, L.I., NY, USA
BOHR	Niels Bohr Institute	Copenhagen, Denmark
BONN	Univ. Bonn	Bonn, Germany
BOST	Boston Univ.	Boston, Mass., USA
BRAN	Brandeis Univ.	Waltham, Mass., USA
BRCO	British Columbia Univ.	Vancouver, Canada
BRIS	H. H. Wills Phys. Lab., U. of Bristol	Bristol, England
BROW	Brown Univ.	Providence, RI, USA
BRUX	Univ. Libre de Bruxelles	Bruxelles, Belgium
BTL	Bell Telephone Labs.	Murray Hill, NJ, USA
BUDA	Central Research Institute of Physics	Budapest, Hungary
CAEN	Lab. de Phys. Corpusculaire	Caen, France
CAGL	Calgary Univ.	Calgary, Alb., Canada
CAMB	Cambridge Univ.	Cambridge, England
CAPE	Univ. of Cape Town	Cape Town, S. Africa
CARL	Carleton Univ.	Ottawa, Canada
CASE	Case Western Reserve Univ.	Cleveland, Ohio, USA
CATH	Catholic Univ. of America	Washington DC, USA

INSTITUTIONS (CONT'D)

CAVE Cavendish Lab., Cambridge Univ.
 CBPF Centro Bras. Pesquisas Fisicas
 CDEF College de France
 CENG CEN, Grenoble
 CERN European Org. for Nuclear Research
 CHIC Univ. of Chicago
 CINC Univ. of Cincinnati
 CIPP Canadian Inst. of Particle Physics
 CIT Calif. Institute of Technology
 CLER Univ. de Clermont-Ferrand
 CLEV Cleveland State Univ.
 CMU Carnegie-Mellon Univ.
 CNRC Canadian National Research Council
 COLC Colorado College
 COLO Univ. of Colorado
 COLU Columbia Univ.
 COPE Copenhagen Univ.
 CORN Cornell Univ.
 COSU Colorado State Univ.
 CRAC Inst. for Nuclear Research
 CRNL Chalk River Nuclear Lab.
 CUNY City Univ. of New York
 CURI Pierre et Marie Curie Univ., Paris VI
 CWSH Central Washington Univ.
 DESY Deutsches Elektronen-Synch.
 DLFT Technische Hogeschool
 DOE Department of Energy
 DORT Univ. Dortmund
 DUKE Duke Univ.
 DUUC University College
 EDIN Univ. of Edinburgh
 EFI Enrico Fermi Inst. for Nuclear Studies
 ELMT Elmhurst College
 EPOL Ecole Polytechnique
 ERLA Univ. Erlangen
 ETHZ Swiss Federal Inst. of Technology
 FIRZ Univ. di Firenze
 FKUU Fukui Univ.
 FNAL Fermi National Accelerator Lab.
 FNRS FNRS
 FRAS Lab. Nazionali del Sincrotrone
 FREI Univ. Freiburg
 FSU Florida State Univ.
 GENE State Univ. of New York, Genesee
 GENO Univ. di Genova
 GESC General Electric R and D Center
 GEVA Univ. de Geneve
 GLAS Univ. of Glasgow
 GMAS George Mason Univ.

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 Fairfax, VA, USA

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GREN Grenoble Univ.
 GUIL Univ. of Surrey at Guildford
 HAIF Technion - Israel Inst. of Technology
 HAMB Univ. Hamburg
 HARV Harvard Univ.
 HAWA Univ. of Hawaii
 HEID Univ. Heidelberg
 HELS Helsingin Yliopisto
 HIRO Hiroshima Univ.
 HOUS Univ. of Houston
 HOWD Howard Univ.
 IDAH Univ. of Idaho
 IIT Illinois Inst. of Tech.
 ILL Univ. of Illinois
 ILLC Univ. of Illinois at Chicago
 IND Univ. of Indiana
 INNS Innsbruck Univ.
 INUS Inst. for Nuclear Study at Tokyo Univ.
 IOAN Univ. of Ioannina
 IOWA Univ. of Iowa
 IPN Inst. de Phys. Nucleaire
 IRPA Intercampus Inst. for Res. at Part. Acc.
 ISU Iowa State Univ.
 ITEP Inst. for Teor. and Exp. Physics
 JAPN Japan Univ. Group Collaboration
 JHU Johns Hopkins Univ.
 JINR Joint Inst. for Nuclear Research
 KANS Univ. of Kansas
 KARL Technische Univ. Karlsruhe
 KEK Nat. Lab for High Energy Phys., Japan
 KEFJ KFA Julich
 KFZK Kernforschungs-zentrum, Karlsruhe
 KHSU Kharkov State Univ.
 KIAE Kurchatov Inst. of Atomic Energy
 KIEL Kiel Univ.
 KIMC Industrial Medical College
 KOBE Kobe Univ.
 KOSI Czech Acad. Sci. Inst. Exp. Phys.
 KYOE Kyoto U. of Education
 KYOT Kyoto Univ.
 LALO Linear Accelerator Lab. Orsay
 LANC Lancaster Univ.
 LANL Los Alamos National Lab
 LAPP Lapp Univ.
 LAUS Univ. of Lausanne
 LBL U. C. Lawrence Berkeley Lab.
 LEBD Lebedev Physics Inst.
 LEHI Lehigh Univ.
 LENI Inst. of Nucl. Phys., Akad. Nauk USSR

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LIBH Lab Interuniv. Belge High Energy
 LISB Nova Univ. de Lisbon
 LIVP Liverpool Univ.
 LJUB Univ. of Ljubljana
 LOIC Imperial Col. of Science and Tech.
 LOQM Queen Mary College
 LOUC University College
 LOWC Westfield College
 LPGP Lab. de Phys. General. Univ. Paris
 LSBF Lisbon Inst. Fisica
 LSU Louisiana State Univ.
 LUMI Centre Univ. de Luminy
 LUND Lund Univ.
 LVLN Univ. Catholique de Louvain
 LYON Inst. de Phys. Nucl., Univ. de Lyon
 MADR Junta de Energia Nuclear
 MANI Univ. of Manitoba
 MANZ Univ. Mainz
 MASA Univ. of Massachusetts
 MCGI McGill Univ.
 MCHS Univ. Manchester
 MEXU Univ. Nac. Autonoma de Mexico
 MIAM Miami Univ.
 MICH Univ. of Michigan
 MILA Univ. di Milano
 MINN Univ. of Minnesota
 MINR Institute for Nuclear Research
 MIT Massachusetts Inst. of Technology
 MONS Univ. de l'Etat, Mons
 MONT Montreal Univ.
 MOSU Moscow State Univ. Inst. of Nucl. Phys.
 MPEI Moscow Phys. Eng. Inst.
 MPHI Max-Planck-Inst. fur Phys.-Astrophys.
 MPIM Max-Planck-Inst. fur Phys.-Astrophys.
 MSU Michigan State Univ.
 MTHO Mt. Holyoke College
 MUNI Munich Univ.
 MUNT Technische Univ. Munich
 NADI Mohamed El-Nadi Research Center
 NAGO Nagoya Univ.
 NANC Univ. de Nancy
 NAPL Univ. di Napoli
 NARA Nara Women's Univ.
 NARU Nara Univ.
 NCSU North Carolina State U.
 NDAM Univ. of Notre Dame
 NEAS Northeastern Univ.
 NEUC Univ. of Neuchatel
 NEVI Nevis Lab.
 Brussels, Belgium
 Lisbon, Portugal
 Liverpool, England
 Ljubljana, Yugoslavia
 London, England
 London, England
 London, England
 London, England
 Paris, France
 Lisbon, Portugal
 Baton Rouge, LA, USA
 Marseille, France
 Lund, Sweden
 Louvain-la-Neuve, Belg.
 Villeurbanne, France
 Madrid, Spain
 Winnipeg, Canada
 Mainz, Germany
 Amherst, Mass., USA
 Montreal, Canada
 Manchester, England
 Mexico City, Mexico
 Miami, FL, USA
 Ann Arbor, Mich., USA
 Milano, Italy
 Minneapolis, Minn., USA
 Moscow, USSR
 Cambridge, Mass., USA
 Mons, Belgium
 Montreal, Que., Canada
 Moscow, USSR
 Moscow, USSR
 Heidelberg, Germany
 Munich, Germany
 East Lansing, Mich., USA
 South Hadley, Mass., USA
 Munich, Germany
 Munich, Germany
 Cairo, Egypt
 Nagoya, Japan
 Nancy, France
 Napoli, Italy
 Nara, Japan
 Nara, Japan
 Raleigh, NC, USA
 Notre Dame, Ind., USA
 Boston, Mass., USA
 Neuchatel, Switzerland
 Irvington-on-Hudson, NY, USA

INSTITUTIONS (CONT'D)

NIFS Ist. di Fis. Sperimentale
 NIHN Nihon Univ.
 NIIG Niigata Univ.
 NIJM R. K. Univ. Nijmegen
 NIIL Northern Illinois Univ.
 NMXS New Mexico State Univ.
 NNIK Nijmegen NIKHEF
 NOVO Inst. of Nuclear Physics
 NRL Naval Research Laboratory
 NRLO Naval Research Lab
 NSF National Science Foundation
 NTUA National Technical Univ. of Athens
 NWES Northwestern Univ.
 NYC New York Univ.
 OAKM Oakland Univ.
 OKAY Okayama Univ.
 OKLN Oklahoma Univ.
 OPEN Open Univ.
 OREG Oregon State Univ.
 OREG Univ. of Oregon
 ORNL Oak Ridge National Lab.
 ORSA Univ. de Paris, Fac. des Science
 OSAK Osaka Univ.
 OSKC Osaka City Univ.
 OSLO Oslo Univ.
 OSSE Science Educ. Inst. of Osaka Pref.
 OSU Ohio State Univ.
 OTTA Univ. of Ottawa
 OXF Oxford Univ.
 PADO Univ. di Padova
 PAVI Univ. di Pavia
 PENN Univ. of Pennsylvania
 PISA Univ. di Pisa
 PITT Univ. of Pittsburgh
 PRAG Institute of Physics, CSAV
 PRIN Princeton Univ.
 PURD Purdue Univ.
 QU'N Queen's Univ.
 REHO Weizmann Inst. of Science
 RHEL Rutherford High Energy Lab.
 RICE William Marsh Rice Univ.
 RIKK Rikkyo University
 ROCH Univ. of Rochester
 ROCK Rockefeller Univ.
 ROMA Univ. di Roma
 RUTG Rutgers Univ.
 SACL Center d'Etudes Nuclear Saclay
 SACR Cal State, Sacramento
 SAGA Saga Univ.
 Napoli, Italy
 Tokyo, Japan
 Niigata, Japan
 Nijmegen, Netherlands
 Dekalb, Ill., USA
 Las Cruces, NM, USA
 Nijmegen, Netherlands
 Novosibirsk, USSR
 Washington, D.C., USA
 Orlando, FL, USA
 Washington, D.C., USA
 Athens, Greece
 Evanston, Ill., USA
 New York, NY, USA
 Oakland, Mich., USA
 Okayama, Japan
 Norman, OK, USA
 Milton Keynes, England
 Corvallis, OR, USA
 Eugene, OR, USA
 Oak Ridge, Tenn., USA
 Orsay, France
 Osaka, Japan
 Osaka, Japan
 Oslo, Norway
 Osaka, Japan
 Columbus, Ohio, USA
 Ottawa, Canada
 Oxford, England
 Padova, Italy
 Pavia, Italy
 Philadelphia, PA, USA
 Pisa, Italy
 Pittsburgh, PA, USA
 Prague, Czechoslovakia
 Princeton, NJ, USA
 Lafayette, Ind., USA
 Kingston, Ont., Canada
 Rehovoth, Israel
 Chilton, Did., Oxon., England
 Houston, Texas, USA
 Rikkyo, Japan
 Rochester, NY, USA
 New York, NY, USA
 Roma, Italy
 New Brunswick, NJ, USA
 Gif-sur-Yvette, France
 Sacramento, CA, USA
 Saga, Japan

INSTITUTIONS (CONT'D)

SAIT Saitama Univ.
 SANT Univ. de Santander
 SASK Univ. of Saskatchewan
 SCUC Univ. of South Carolina at Columbia
 SEOU Korea Univ. at Seoul
 SERP Inst. of High Energy Physics
 SHAN Shandoong Univ.
 SHEF Univ. of Sheffield
 SHIR Shiraz U.
 SHMP Univ. of Southampton
 SIEG Siegen Univ.
 SIEM Siemens Schuckertwerke AG
 SLAC Stanford Linear Accel. Center
 SMAS Southeastern Massachusetts Univ.
 SOFC High Inst. of Chem. Tech.
 SOFI Bulgarian Acad. of Science
 SRIP State Res. Inst. Photochem. Proj.
 STAN Stanford Univ.
 STEV Stevens Inst. of Tech.
 STOJ Stockholm Univ.
 STON State Univ. of New York at Stonybrook
 STRB Centre des Res. Nucleaires
 SWRK Inst. of Nuclear Research
 SYDN Univ. of Sydney
 SYRA Syracuse Univ.
 TAMU Texas A and M Univ.
 TATA Tata Inst. of Fundamental Research
 TBSU Tbilisi State Univ.
 TELA Univ. of Tel-Aviv
 TEMP Temple Univ.
 TENN Univ. of Tennessee
 TEXA Univ. of Texas at Austin
 THES Univ. of Thessaloniki
 TMSK Nucl. Phys. Inst., Tomsk Polytech. Inst.
 TMU Tokyo Metropolitan Univ.
 TOTO Univ. of Toronto
 TOCR Cosmic Ray Lab, Tokyo Univ.
 TOGA Tohoku-Gakuin Univ.
 TOHO Tohoku Univ.
 TOKY Univ. of Tokyo
 TORI Univ. di Torino
 TRIU TRIUMF, Univ. of British Columbia
 TRST Univ. di Trieste
 TSUK Tsukuba Univ.

Saitama, Japan
 Santander, Spain
 Saskatoon, Canada
 Columbia, SC, USA
 Seoul, S. Korea
 Serpukhov, USSR
 Jinan, Shandong, China
 Sheffield, Yorks., England
 Shiraz, Iran
 Southampton, England
 Huttental, Germany
 Erlangen, Germany
 Stanford, Calif., USA
 North Dartmouth, Mass., USA
 Sofia, Bulgaria
 Sofia, Bulgaria
 Moscow, USSR
 Stanford, Calif., USA
 Hoboken, NJ, USA
 Stockholm, Sweden
 Stonybrook, LI, NY, USA
 Strasbourg, France
 Swierk, Poland
 Sydney, Australia
 Syracuse, NY, USA
 College Station, TX, USA
 Bombay, India
 Tbilisi, USSR
 Tel-Aviv, Israel
 Philadelphia, PA, USA
 Knoxville, Tenn., USA
 Austin, TX, USA
 Thessaloniki, Greece
 Tomsk, USSR
 Tokyo, Japan
 Toronto, Canada
 Tokyo, Japan
 Miyagi, Japan
 Sendai, Japan
 Tokyo, Japan
 Torino, Italy
 Vancouver, Canada
 Trieste, Italy
 Ibaraki, Japan

INSTITUTIONS (CONT'D)

TUAT Tokyo Univ. of Agriculture and Tech.
 TUFT Tufts Univ.
 UATH Univ. of Athens
 UBEL Univ. of Belgrade
 UCB Univ. of Calif. at Berkeley
 UCD Univ. of Calif. at Davis
 UCI Univ. of Calif. at Irvine
 UCLA Univ. of Calif. at Los Angeles
 UCR Univ. of Calif. at Riverside
 UCSB Univ. of Calif. at Santa Barbara
 UCSC Univ. of Calif. at Santa Cruz
 UCSD Univ. of Calif. at San Diego
 UMAD Univ. de Madrid
 UMD Univ. of Maryland
 UNM Univ. of New Mexico
 UTAH Univ. of Utah
 UTRE University of Utrecht
 UUPP Univ. of Uppsala
 VALE Univ. de Valencia
 VAND Vanderbilt Univ.
 VASC Virginia State Coll.
 VASS Vassar College
 VICT Victoria Univ.
 VIEN Inst. for High En. Phys., A. A. S.
 VILL SIN, Villigen Univ. High Energy Physics
 VIRG Univ. of Virginia
 VPI Virginia Polytechnic Inst.
 VRIJ Vrije Univ.
 WARS Univ. of Warsaw
 WASH Univ. of Washington
 WIEN Univ. Wien
 WILL College of William and Mary
 WINR Warsaw Inst. of Nuclear Research
 WISC Univ. of Wisconsin
 WSUP Washington State Univ.
 WUPP Univ. Wuppertal
 WURZ Wurzburg Univ.
 WYOM Univ. of Wyoming
 YALE Yale Univ.
 YERE Yerevan Physics Inst.
 YOKO Yokohama National Univ.
 YORK York University
 ZAGR Inst. Ruder Boskovic, Zagreb
 ZURI Zurich University

Tokyo, Japan
 Medford, Mass., USA
 Athens, Greece
 Belgrade, Yugoslavia
 Berkeley, Calif., USA
 Davis, Calif., USA
 Irvine, Calif., USA
 Los Angeles, Calif., USA
 Riverside, Calif., USA
 Santa Barbara, Calif., USA
 Santa Cruz, Calif., USA
 La Jolla, Calif., USA
 Madrid, Spain
 College Park, MD, USA
 Albuquerque, New Mex., USA
 Salt Lake City, Utah, USA
 Utrecht, Netherlands
 Uppsala, Sweden
 Valencia, Spain
 Nashville, Tenn., USA
 Petersburg, VA, USA
 Poughkeepsie, NY, USA
 Victoria, BC, Canada
 Vienna, Austria
 Villigen, Switzerland
 Charlottesville, VA, USA
 Blacksburg, VA, USA
 Amsterdam, Netherlands
 Warsaw, Poland
 Seattle, Wash., USA
 Vienna, Austria
 Williamsburg, VA, USA
 Warsaw, Poland
 Madison, Wisc., USA
 Pullman, WA, USA
 Wuppertal, Germany
 Wurzburg, Germany
 Laramie, Wyoming, USA
 New Haven, Conn., USA
 Yerevan, Armenia, USSR
 Yokohama, Japan
 Downsview, Ont., Canada
 Zagreb, Yugoslavia
 Zurich, Switzerland

BROOKHAVEN AGS BEAMS (Source: G. Bunce, BNL)

Up to 10^{13} protons per pulse are accelerated typically to 28.5 GeV kinetic energy (31 GeV has been obtained). At 28.5 GeV, the period is 2.4 sec for slow extraction (with a 1-sec flattop), or 1.4 sec for fast extraction (used for neutrino beams). Counting rates may be estimated using the nominal beam spill time of 1 sec.

	Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle (°)	Solid angle (msr)	Beam length (m)	Particles	Flux in thousands per 10^{12} protons on target	at (GeV/c)	Comments
Separated	B4	1.5-6 1.5-9	3	3	0.3	81	K^+/K^- $\bar{p}$ π^+/π^-	270/120 100 $4 \times 10^4/3 \times 10^4$	4	Usually 2×10^{12} ppp on target: $\pi/K \sim 3$ in K beam; $\pi/\bar{p} \sim 3-4$
	B2	- same characteristics as B4 above -								To multiparticle spectrometer
	C2, C4	≤ 1.1	2	10.5	2.6	15	K^+/K^- $\bar{p}$ π^+/π^-	40/12 2 8×10^4	0.75	Usually 2×10^{12} ppp; $\pi/K \sim 10$ in K beam
Unseparated	C6, C8	≤ 0.8	2.5	5	15	15	K^+/K^- $\bar{p}$ π^+/π^-	200/60 14 6×10^5	0.75	Usually 2×10^{12} ppp; $\pi/K \sim 20$
	A1	5-24	1.5	0	0.2	130	π^-	1000	22	To multiparticle spectrometer; 10^{12} ppp; 25 cm Be target
	B1	5-24	3	0	0.3	75	K^+/K^- $p/\bar{p}$ π^+/π^-	2500/700 $1.5 \times 10^5/200$ $6 \times 10^4/3 \times 10^4$	10	Usually 2×10^{12} ppp
Neutral	C1	5-24	5	0	0.8	61	K^+/K^- $p/\bar{p}$ π^+/π^-	9000/400 $3 \times 10^4/30$ $10^5/3 \times 10^4$	16	Usually 2×10^{12} ppp; $\mu/\pi \sim 3\%$ in π beam
	D2	0.1-0.3(π) 0.05-0.15(μ)	9(π)	55(π)	50(π)	9	μ^-	2000	0.10	Muon channel; flux in 100 cm^2 with $\Delta p/p = \pm 2\%$; design intensity
	A3	1-28		0	0.0035	8	K_L n	2000 10^5	1-28	Typically 10^{11} ppp; alternates with A1; design intensity
	B5	6-28		0	0.01	6	n	10^5	6-28	Typically 10^{12} ppp; design intensity
	U	1.5 (peak)					$\nu/\bar{\nu}$	$10^7/7 \times 10^6$ per m^2		Typically 9×10^{12} ppp; flux averaged over 0.7 m radius

CERN PS BEAMS [Source: *Experiments at CERN in 1982*, D.R.O. Morrison (editor)]

East Area -- These are the primary beams.

Beam	Momentum (GeV/c)	Particles	Flux/cycle	Comments
e_{15}	8-24	p	$\geq 3 \times 10^{12}$	Slow ejection: splits into three branches
e_{18}	≤ 22	p	$\geq 5 \times 10^{12}$	Fast ejection

East Area -- These are counter beams. They are all fed by branches of the e_{15} beam above. The fluxes are for $\Delta p/p = \pm 1\%$ and 10^{12} 24-GeV/c protons on the external target; they assume 30% target efficiency (fluxes also depend on the external target used). The first two beams are enriched by electrostatic separation.

Beam	Momentum (GeV/c)	Particles	Flux/cycle	Comments
k_{26}	≤ 0.55	K^-	4×10^3	Flux at 0.55 GeV/c
k_{23}	0.5-1.0	$\bar{p}$	5×10^3	Flux at 0.8 GeV/c; for tests
c_{13}	≤ 12	p	3×10^6	Fluxes (design values)
	"	π^+	6×10^4	at 10 GeV/c; for equipment tests
	≤ 18	π^-	2×10^5	
t_6	≤ 18	p	5×10^5	Fluxes (design values)
	"	π^+	5×10^3	at 18 GeV/c; for equipment tests
	"	π^-	2×10^3	
	"	π^-	3×10^5	Flux at 5 GeV/c
t_7	1-10	p, π^+ , e^+ $\pi^- e^-$		e^- is 7% of beam at 5 GeV/c. 50% at 2 GeV/c

South Area (LEAR) -- Design values for LEAR. The flux is for a long spill of 10^9 antiprotons every 1000 sec, with a 90% duty cycle in the final stage. The antiproton beam will be split into three branches.

Beam	Momentum range (GeV/c)	Flux (per sec)	Comments
External beam,	0.3-0.6	10^6	Stage 1, Easter 83
with ultra-slow	0.2-1.6		Stage 2, end 83
ejection from LEAR	0.1-2.0		Stage 3

North Area Beams (NA experiments)

Beam	Maximum momentum (GeV/c)	Maximum intensity for 10^{12} protons at 400 GeV/c	Beam type
H2	400	$6 \times 10^7 \pi^+$ at 200 GeV/c $2 \times 10^7 \pi^-$ " " " $2.5 \times 10^6 e^\pm$ at 150 " "	High energy hadrons or electrons (also enriched $K^+/\bar{p}$)
H4/E4	330	$5 \times 10^7 \pi^+$ at 200 GeV/c $1.5 \times 10^7 \pi^-$ " " " $1.5 \times 10^6 e^\pm$ at 150 " "	High energy hadrons or electrons (H4-test is an alternate test branch)
H6	200	$6 \times 10^7 \pi^+$ at 150 GeV/c $2.5 \times 10^7 \pi^-$ " " "	Medium energy hadrons
H8	400	$1.5 \times 10^8 \pi^+$ at 200 GeV/c $5 \times 10^7 \pi^-$ " " "	High energy hadrons (electrons)
M2	280	$1.5 \times 10^7 \mu^+$ at 200 GeV/c $5 \times 10^6 \mu^-$ " " "	High intensity muons
P0	400/450	$\sim 10^{13}$ p at 400/450 GeV/c	High intensity primary protons for production of H10 or E12
H10	400/450	$1.2 \times 10^9 \pi^+$ at 200 GeV/c $4 \times 10^8 \pi^-$ " " "	High energy high-intensity hadrons or protons
E12	300	$1 \times 10^8 e^-$ total with energy > 100 GeV	Broad-band electrons/photons

West Area Beams (WA experiments) The West Area beams are being modified to higher energies. The table below gives some calculated properties of the upgraded beams, which should be available from May 1983.

Beam	Maximum momentum (GeV/c)	Intensity for 10^{12} protons at 450 GeV/c	Beam type
H1	450	$8 \times 10^7 \pi^-$ at 200 GeV/c $2 \times 10^8 \pi^+$ " " " $1.5 \times 10^6 e^\pm$ " " "	Hadrons, electrons, or attenuated protons
H3	450	$4 \times 10^7 \pi^-$ at 200 GeV/c $1 \times 10^8 \pi^+$ " " " $7 \times 10^5 e^\pm$ " " "	Hadrons, electrons, or attenuated protons
X3	40*	$10^3 \cdot 10^4$ tertiaries/ 10^7 incident H3 particles	Test beam; tertiary electrons + hadrons
X5	100**	$10^3 \cdot 10^4$ tertiaries/ 10^7 incident H3 particles	Test beam; tertiary electrons + hadrons
X7	100***	$10^3 \cdot 10^4$ tertiaries/ 10^7 incident H3 particles	Test beam; tertiary electrons + hadrons

*X3 can also be run with the H3 optics, on high energy secondaries.

**X5 can be run exceptionally at 300 GeV/c for calibration of the neutrino detectors.

***X7 can be run exceptionally at 150 GeV/c to BEBC.

Extra power supplies and magnets have to be taken from other beams.

CERN SPS BEAMS (continued)

West Area Neutrino Beams (WA experiments) -- Reference: CERN/EF/BEAM 80-7, A. Grant, High momentum version of the narrow-band neutrino beam N3.

Beam	Parent momentum (GeV/c)	Particle	Flux for 10^{13} incident protons [†]	$\langle E_\nu \rangle$ (GeV)	σ_{rms} on E_ν (GeV)	Beam type
N1	450 protons	ν	$5.3 \times 10^{10}/m^2$ (~ 0.25 ev/ton)	~ 30		Wide-band spectrum up to 450 GeV
		$\bar{\nu}$	$2.3 \times 10^{10}/m^2$ (~ 0.25 ev/ton)	~ 30		
N3	380 secondaries	ν_π	1.19×10^7	88	41	Narrow-band dichromatic beam with 450 GeV primary protons
		ν_K	5.4×10^6	259	49	
	350	$\bar{\nu}_\pi$	1.4×10^7	82	37	
		$\bar{\nu}_K$	1.7×10^5	248	48	
		ν_π	3.8×10^7	80	38	
		ν_K	2.5×10^7	251	45	
	320	$\bar{\nu}_\pi$	3.2×10^7	78	35	
		$\bar{\nu}_K$	7.2×10^5	224	49	
		ν_π	1.1×10^8	78	34	
		ν_K	8.5×10^7	228	45	
	300	$\bar{\nu}_\pi$	5.3×10^7	74	32	
		$\bar{\nu}_K$	1.7×10^6	220	37	
		ν_π	1.9×10^8	73	32	
		ν_K	1.2×10^8	220	41	
	275	$\bar{\nu}_\pi$	1.1×10^9	68	29	
		$\bar{\nu}_K$	3.4×10^6	215	34	
	200	$\bar{\nu}_\pi$	4.2×10^8	55	19	
		$\bar{\nu}_K$	1.8×10^7	167	26	
		ν_π	1.0×10^9	54	20	
		ν_K	2.4×10^8	165	20	

[†] Fluxes for the N3 beam are at the WA1 (CDHS) detector in a circle of diameter 1.5 m.

FERMILAB BEAMS (Source: H.B. White, Jr., FNAL)

Currently, protons are accelerated to a maximum momentum of 500 GeV/c. The maximum intensity is 3×10^{13} protons per pulse, the repetition rate is 0.1/sec. and the beam spill time is 1 sec. With the commissioning of the *Energy Saver Project*, protons may be accelerated to momenta greater than 500 GeV/c. The intensity and repetition rate will be determined in practical operation. Maximum design momentum is 1000 GeV/c.

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle (mr)	Solid angle (μsr)	Particles	Flux in thousands per sec per 10^{12} protons on target	at (GeV/c)	Comments
*PW	1000 (peak)				p	$< 2 \times 10^{13}$		Primary proton transport to PW target
PW	20-250	7	0-8	8	π^-	10^5	200	P-west secondary beam
	20-300	5	0		$\bar{p}$	1000	100	P-west secondary beam
*PW	750 (peak)				π	4×10^6	200	High intensity pion beam
					$\bar{p}$	10^4	175	P-west secondary beam
*PB	800 (peak)	15		4	e	3×10^4	500	Wide band charged and neutral beam
PE	300 (peak)	2.3	0-2	1.2	e^-	10^4	200	Also provides tagged photons
	300 (peak)		0	0.04	n	4000	> 100	Also tagged photons
PC	20-350				Σ^-	2000	300	P-center charged hyperons
					Ω^-	< 10	250	
ME(M1)	20-400	0.1-1.5	0-7	2	π	1000 (at 3.5mr)	200	Medium resolution beam
(M2)	20-400	0.1-1.4	0-1.5	0.2	p π^-	3000 (at 0.6mr) 300	200	Presently, diffracted protons available at 400 GeV/c with flux $< 3 \times 10^{12}$ per pulse
(M3)	300 (peak)		0.3-1.1	$\sim 10^-$	n	200/cm ²	total	
(M4)	35-200	6	7-8	1	K^- π^-	60 100	75	Presently a test beam
*ME	1000 (peak)				p	$< 5 \times 10^9$	1000	Primary protons
*MP	70-350	0 ± 5.0	0 ± 1.0		p	10^5	600	Polarized protons from 1000 GeV/c primary
					$\bar{p}$	< 7000	200	Antiprotons from 1000 GeV/c primary
	1000				p and π			Also capable of unpolarized transport
*MC	100				K_L^0 and n	2×10^5	100	Neutral beam with 1000 GeV/c primary
*MB	200 (peak)				π and K			Low intensity wide-angle test beam
*MT(M5)	100 (peak)				$\pi^\pm$ $e^\pm$			Low intensity wide-angle test beam to present multiparticle spectrometer

continued on next page

FERMILAB BEAMS (continued)

Beam	Momentum range (GeV/c)	$\pm\Delta p/p$ (%)	Production angle (mr)	Solid angle (μsr)	Particles	Flux in thousands per sec per 10^{12} → protons on target	at (GeV/c)	Comments
*MW	1000 (peak)	10	0 ± 0.7		p	6×10^6	600	Beam transport to possible new multiparticle spectrometer; assumes 1000 GeV/c on target
					π^+	5×10^5	600	
					K^+	10^5	600	
					π^-	1.5×10^5	600	
					K^-	10^4	500	
					$\bar{p}$	10^4	300	
*MT	1000 (peak)	0.1	0		p	10^5	1000	Temporary beam to multiparticle spectrometer (will convert to test beam)
NW(N1)	50-275	2	0-1	4-16	μ^+	150	225	To muon/hadron spectrometer. 400 GeV/c on target
	100-275				π^+	>1000		
*NW								Test beam
*NC	1000		0		p			Primary beam transport to center target
*NC-D	750 (peak)		0		$\nu/\bar{\nu}$	variable		Narrow band, sign-selected neutrino beam
*NC-T	1000 (peak)		0		$\nu/\bar{\nu}$	variable		Broad band, quadrupole focus
*NE	1000 (peak)		0		p	$\sim 10^7$	1000	To hybrid spectrometer system
*NT	500		0-3		hadrons	$\sim 10^4$	500	Test beam for neutrino detectors
*NP	1000		0		p	$\sim 10^{10}$	1000	Proton transport to prompt neutrino detector
*NM	275-750	20			$\mu^\pm$	$\sim 10^4$	750	Tevatron muon beam

*These beams will be commissioned as part of the Tevatron II project. Design characteristics are shown; detailed characteristics will be determined in operation. These beams will also replace present beams in most cases.

KEK BEAMS (Source: A. Kusumegi, KEK)

Protons are accelerated to a maximum momentum of 13 GeV/c. The maximum intensity is 4.0×10^{12} protons per pulse. The repetition rate is 0.45/sec.

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle ($^\circ$)	Solid angle (msr)	Beam length (m)	Particles	Typical flux in particles per pulse	$\rightarrow$ at (GeV/c)	Comments
EP1	4-13					p	5×10^{10}		Fast extraction
EP2	4-13					p	2×10^{12}		Slow extraction: branches feed the K2, K3, and π - μ beams
$\pi 1$	4-8	2	1.5	0.33	33	π^+/π^-	$2 \times 10^6/6 \times 10^5$	8	Under construction: fluxes estimated
$\pi 2$	2-4.3	1	10	0.594	31.3	$p/\bar{p}$ π^+/π^-	$10^4/10^2$ $2 \times 10^5/1 \times 10^5$	3	Internal target beam: fluxes for 10^{11} ppp
T1	0.5-2.3	2	23	0.16	18.8	π^+/π^-	$5 \times 10^4/4 \times 10^3$	1	Internal target beam: fluxes for 10^{11} ppp
T2	0.5-6.0	4	15	0.35	37.0	π^+/π^-	10^4	4	
K2	1-2	3	0	1.02	27.9	K^+/K^- $p/\bar{p}$ π^+/π^-	$1.5 \times 10^5/5.7 \times 10^4$ $2 \times 10^7/1.2 \times 10^4$ $1.7 \times 10^7/1.4 \times 10^7$	2	
K3-S (K3-L)	0.5-1.0 "	2 "	0 "	7.3 (3.0)	14.4 (16.5)	K^+/K^- $p/\bar{p}$ π^+/π^-	$4.2 \times 10^4/1.0 \times 10^4$ $7 \times 10^7/3.5 \times 10^2$ $5 \times 10^7/5 \times 10^7$	0.6 0.8 0.8	Fluxes are for the S (short) mode of operation
π - μ	0.1-0.45		87	20		$\pi^\pm$ $\mu^\pm$	10^6 10^4	0.15	

LAMPF PARTICLE PHYSICS BEAMS (Source: D. Dodder, Los Alamos)

The primary 800 MeV H^+ beam normally runs with an average current up to 700 μA , but 1.2 mA has been achieved. The macro duty factor is 6 to 9%, with a macrostructure of 120 pps with a maximum pulse length of 750 μs . Each macropulse consists of a 0.25 ns burst every 5 ns. This beam is used to generate the meson and neutrino beams described below, as well as additional beams for other purposes. Simultaneously with the H^+ beam a low current (5 μA unpolarized; up to 25 nA polarized) H^- beam is accelerated to a desired energy between 212 and 800 MeV with a duty factor of 3 to 9%.

Beam	Momentum (MeV/c)	$\pm \Delta p/p$ (%)	Solid angle (msr)	Particle	Flux in particles/sec or current	at (MeV/c)	Comments
A	1460	0.1		p	700 μA	1460	Main beam; 1.2 mA has been achieved
LEP	77-415	0.05-2.8	0-17	π^+ π^-	7×10^8 $\sim 2 \times 10^8$	195	Low energy pion beam; achromatic; flux at $\Delta p/p = 2.8\%$
EPICS	156-415	2.0	3.4	π^+ π^-	1.5×10^8 3.3×10^7	300	Energetic pion channel and spectrometer
p ³	100-750	5.0	7.0	π^+ π^-	2×10^9 3×10^8	470	High energy pions; achromatic
	28			μ^+	1.5×10^6	28	
	100			μ^-	0.8×10^6	100	μ^- flux is without degrader
Stopped muon	25-250			μ^+ μ^-	1.4×10^8 2.8×10^7	130	
	665-1460			p $\bar{p}$	5 μA 20 nA	1460	Current reduced to 1/3 for <1460 MeV/c Polar. = 0.8 N.L.S available
	<1460	0.8		$\bar{n}$	10^4		Polar. = 0.3; max 0° is given;
	"	0.8		n	10^7		additional ports up to 37° give lower energies "Unpolarized" beam has P = 0.2 at 20°
External proton beam	665-1460	<0.1	<<6	p H^0 H^- $\bar{p}$ $\bar{H}^0$ $\bar{H}^-$	<100 nA " " 10 nA " " "	1460	H^- beam stripped to H^0 or H^+ Polar. = 0.8 available in N.L.S directions; independent of polarization direction of internal beam
HRS	475-1460	0.26		p $\bar{p}$	2 μA 10 nA		For high resolution proton spectrometer
Neutrino facility	0-53		$\sim 4\pi$ sr	ν_e ν_μ $\bar{\nu}_\mu$	3×10^{14} " "	total	Peak momentum is 35 MeV/c for ν_μ Flux at 8 m is 4×10^8 $\nu/cm^2\text{-sec}$ Source subtends $\pm 1.5^\circ$ for target 8 m away

SERPUKHOV BEAMS (Source: Yu.G. Ryabov and V.V. Ezhela, Serpukhov)

Protons are accelerated to a maximum momentum of 70 GeV/c. The intensity is about 3×10^{12} protons per pulse. The repetition rate is 0.2/sec, and the beam spill time is about 2 sec.

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle (mr)	Solid angle (μ sr)	Beam length (m)	Particles	Typical flux in particles per pulse	at (GeV/c)	Comments
2/14	30-70	1	6-35	10	120	hadrons +	10^6	60	Internal target lines
	30-60	1	0-5	30		hadrons	10^6	60	2A, 2B, 14; the e ⁺ 's may
	5-45	3	0-7	30		e	10^6	30	be used for polarized γ 's
4	20-50	1	0-5	40	130	hadrons -	6×10^6	40	Internal target lines 4A, 4B, 4V, 4I, 4F
18	3-17	2	0-200	120	50	hadrons +	10^8	5	Internal target,
	2-14	2	240-400	80		hadrons	10^4	8	injection in ring
20	0.4-3.2	1	0	2800	20	hadrons $\pm$	10^8	1	External target, fast ejection
19	70		0			p	10^{12}	70	Slow ejection
4N	≤ 70		12	1	40	neutrals	10^7	total	Internal target
7	30-70	0.25	11.5	1-4	511.5	p	10^6	69	Internal target, unseparated
	20-50	0.25	0	40		π^+ , K^+ , $\bar{p}$	5-10		Fast ejection, separated
	20-55	0.25	0	10		π^-	5-10		Fast ejection, unseparated
9	<25	0.5	0	30	194	π^+ , K^+ , $\bar{p}$, d	5		Fast ejection, separated
	10-13	1	0	30		$\bar{d}$	8	12.2	Separated
8	<40 (mean=6)		0	2500	500	ν , $\bar{\nu}$	5×10^9	total	Wide-band neutrino beam

SIN BEAMS (Source: SIN Users' Handbook, 1981)

The average energy of the primary proton beam is 589 MeV with a FWHM spread of 0.4 %. The pulse rate is 5×10^7 per sec and the pulse width is 1 nsec. The maximum intensity at extraction is about 170 μA .

Pion Beams

Beam	Energy range (MeV)	Minimum $\pm \Delta p/p$ (%)	Maximum flux (per sec)	for maximum flux		
				Energy (MeV)	$\pm \Delta p/p$ (%)	FWHM spot size H×V (cm)
πE1	50-350	0.2	π^+ 9×10^9 π^- 8×10^8	225	2.5	2×5
πE3	40-125	1.0	π^+ 7×10^8 π^- 1.3×10^8	85	5.0	5.6×2.6
πM3	50-350	0.1	π^+ 1×10^8 π^- 9×10^6	225	3.0	4×2
πM1	50-350	0.05	π^+ 3×10^7 π^- 3×10^6	225	1.0	0.9×0.7

Muon Beams (μ^+ fluxes are 4 or 5 times μ^- fluxes)

Beam	Momentum (MeV/c)	μ^- flux (per sec)	Δ -range (g/cm)	Stop density μ^- (stops/g-sec)	e^-/μ^- ratio	Burst width (nsec)	FWHM spot size H×V (cm)
μE1	120-50	3×10^7 - 4×10^5	4-0.3	1×10^5 - 3×10^4	0.01-3	≥ 4	6×4
μE2	125-50	10^7 - 10^5	2-0.15	4×10^4 - 1×10^4	0.01-3	≥ 4	10×6
μE3	stopping			3.5×10^6			
μE4	stopping			2×10^5	$0.3(\pi^-/\mu^-)$		
πE3	28	$10^7(\mu^+)$	0.04	$2 \times 10^7(\mu^+)$	$0.1(e^+/\mu^+)$		5×4

Polarized Proton Beam (pM1)

Mode of operation	Energy (MeV)	Polarization (%)	Flux (per sec)
Scattered from target M	590-225	38	10^{10} - 3×10^7
Polarized ion source	590	80	6×10^{11}

Neutron Beam (nE1)

Energy range (MeV)	Intensity in 25 cm ² spot (per MeV-sec)	Available flight path (m)	Resolution from T.O.F. at 590 MeV (MeV)
590-200	4×10^5 - 1.4×10^5	60	7

SLAC BEAMS (Source: T. Fieguth, SLAC)

Accelerator mode	Particles	Momenta (GeV/c)	Particles per pulse	Pulse length (μ s)	Repetition rate (Hz)	Comments
Normal	e^-	≤ 23.5	$\leq 5 \times 10^{11}$	1.6	≤ 360	To conserve power, repetition rates rarely exceed 180 Hz. The e^- beam would require installation of a high-power source.
	e^+	≤ 15.0	$\leq 2 \times 10^{10}$	1.6	≤ 90	
SLED	e^-	≤ 33.5	10^{11}	0.2	≤ 360	

Colliding beams	Particles	C.m. energy (GeV)	Peak luminosity ($\text{cm}^{-2} \text{sec}^{-1}$)	Average luminosity ($\text{cm}^{-2} \text{sec}^{-1}$)	Comments
SPEAR	e^+e^-	2-7.4	2×10^{31} at 6.4 GeV	8×10^{30}	SPEAR has 2 interaction regions. PEP 6 At PEP, the luminosity scales as E^{-2} (E^{-3}) for c.m. energies below (above) that at the peak
PEP	e^+e^-	8-36	1.7×10^{31} at 29 GeV	8×10^{30}	

Beam	Momentum range (GeV/c)	$\pm \Delta p/p$ (%)	Production angle ($^\circ$)	Solid angle (msr)	Particles	Maximum particles per pulse	at (GeV/c)	Repetition rate (Hz)	Facility	Comments
21	1-16	≤ 4.0	1	0.03	K^+/K^- $p/\bar{p}$ π^+/π^- e^- e^+	17/8 40/6 10^3 10^4 10^4	10	≤ 180	LASS	Separated $\pi^+/K \approx 1/30$ $\pi/\bar{p} \approx 1/14$
	1-8				e^- e^+	10^4 10^4	2.5			
27	20	9.0 FWHM	0	10^{-7}	γ	10^2	20	≤ 20	40" b.c. hybrid facility	Backscattered laser beam
3	≤ 15 ≤ 23.5 3.257 j (j=1,...,6) 3.237 j (j=1,...,6) ≤ 21.5 5-15 ≤ 21.5	0.1-1.0 0.1-1.0 0.1-1.0 ≥ 0.5 Brems. 7-10 Brems.	0 0 0 0 0 0		e^- e^- e^- e^- γ γ γ	2×10^{10} 5×10^{11} 5×10^{11} 10^9 4×10^9 EQ 5×10^7 EQ 2×10^8 EQ	All All 20 All 	≤ 90 ≤ 360 120, 180 ≤ 360 ≤ 360 ≤ 360 ≤ 360	ESA 16, 8, & 20 GeV/c spectrometers	e^+ beam requires high power source; all fluxes at $\Delta p/p = \pm 0.25\%$ See footnote A See footnote B 0° bremsstrahlung See footnote C See footnote D
6	0.1-16 1-16	≤ 2.0	1.6-6	0.03	e^- π^-	10 10		≤ 60	Test beam	
19	1-16	0.25	0		e^+	10	10	≤ 60	Test beam	Very pure; $\sigma_A = 1$ mm

- A. High intensity source; longitudinal polarization ≈ 0.4
 B. Low intensity source; longitudinal polarization ≈ 0.85
 C. Coherent bremsstrahlung, linearly polarized (10^9 EQ without collimation)
 D. Linearly polarized at maximum energy by coherent pair production in graphite

TRIUMF BEAMS [Source: Status of TRIUMF Plans for Development, G. Dutto, E.W. Blackmore, and M.K. Craddock, TRI-82-PP-37 (October 1982)]

The cyclotron energy range is 180-520 MeV with an energy spread of 0.1% (FWHM). The unpolarized intensity is 150 μ A, and the polarized intensity is 300 nA; the polarization is 75-82%. The BL4/BL1A split ratio is $1/10^4$. The phase width is variable from 0.5 to 6 ns. The pulse separation is 43 or 217 ns. There are plans to upgrade various performance levels.

Main beam lines

Beam	Particle	Energy (MeV)	Intensity	Momentum spread FWHM (%)	Polarization (%)	Spot size H×V(cm)
BL1A	p	180-520	120 μ A (500 MeV)	0.2	0	0.2×0.5
BL4/1B	$\bar{p}$	180-520	300 nA	0.2	70-80	0.2×0.5
BL4A	$\bar{n}$	160-500	10^8 /sec	1.0	40-75	6×6
BL2C	p	65-100	10 μ A	0.2	0	1×2

Secondary lines The M8, M9, and M20 fluxes are for full momentum acceptance with 100 μ A of protons on a 10-cm Be target. The M11, M13, and M15 fluxes are for full momentum acceptance with 100 μ A of protons on a 1-cm C target. Beams of π^- and μ^- have the same properties as the π^+ and μ^+ beams, except fluxes are about 5 times lower.

Beam	Particle	Momentum (MeV/c)	Particle flux (per sec)	$\rightarrow$ at (MeV/c)	Momentum spread FWHM (%)	Polarization (%)	Spot size H×V(cm)
M8	π^-	0-220	1.3×10^8	180	13	--	1×2
M9	μ^-	30-150	10^6	77	14	50	8×8
	π^+	30-250	2×10^8	120	14	--	10×2
M20	μ^+	30-200	2.5×10^6	30	5	>90	4×3
			2×10^6	85	8	75	8×8
M13	π^+	30-130	5×10^7	130	10	--	3×2
	μ^+	30 (surface)	1.3×10^6	30	10	>90	3×2
M11	π^+	90-470	5×10^6	200	3	--	2×3
M15 (design)	μ^+	30 (surface)	1.6×10^6	30	12	>90	2×1