1 of 2

BNL-34518
(Rev. 4/93)
Ninth Edition
Informal Report

BROOKHAVEN NATIONAL LABORATORY
Upton, Long Island
New York 11973

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AGS EXPERIMENTS: 1990 • 1991 • 1992

BNL 34518
(Rev. 4/93)
Ninth Edition
Informal Report

AGS EXPERIMENTS - 1990, 1991, 1992

J. C. Depken

April 1993

AGS Department
Experimental Planning and Support Division
BROOKHAVEN NATIONAL LABORATORY
Associated University, Inc.
Upton, New York 11973 U.S.A.

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AGS Experiments - 1990, 1991, and 1992

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- 2. • Table of Beam Parameters and Fluxes
- 3. • Experiment Schedule "*as run*"
- 4. • Proposed 1993 Schedule
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- 107. • Publications of AGS Experiments begin here
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- 167. • Appendix

This is the *ninth edition*. Please forward suggestions and changes for future editions to:

Division Head, EP&S Division
Brookhaven National Laboratory
Building 911B
Upton, New York 11973 U.S.A.

The cutoff date for approved experiments to be included in this edition was January 1, 1993.

Flux/ 10^{13} protons on target

Beam	GeV/c	$\delta p/p$ (% fwhm)	Prod Ang $\Delta\theta$ (mrad)	K^+	K^-	P	$\bar{P}$	π^+	π^-	GeV/c	Purity	Remarks
Separated Charged Particle Beams												
C4	≤ 0.83	4	0.0	12.	4.6×10^6	1.5×10^6	1.5×10^9	1.0×10^6	6.0×10^9	6.0×10^9	$\pi^+/K^+ = 0.4$	L=18m, LESBIII, Commissioned FY92
C6,C8	≤ 0.75	5	5.0	10.	3.0×10^6	1.0×10^6	1.0×10^9	1.4×10^5	6.0×10^9	6.0×10^9	$\pi^-/K^- = 5$	L=15m, LESBII
D6	≤ 1.9	6	5.0	1.6	6.7×10^6	2.8×10^6	3.7×10^6	1.3×10^6	6.0×10^8	5.0×10^8	$\pi^-/K^- = 2.2$	L=31m, 2GEV Beam Line
										1.80	$\pi^-/\bar{p} = .07$	
Unseparated Charged Particle Beams												
A1*	5-28	3	0	0.2	1.9×10^6	2.9×10^4	5.0×10^9	2.3×10^3	3.0×10^7	1.0×10^7	18	L=130m to MPS, "OR" w/A3
A2	<6.5	5	3.5	0.75	3.4×10^7	1.1×10^7	4.0×10^6	3.7×10^6	7.4×10^8	5.1×10^8	6	L=27m, Commission FY93
A3*	1-28	4	0	0.1			6.0×10^6		1.0×10^8	4.0×10^7	14	HIP Beam/Test Beam, "OR" w/A1
B1*	5-28	3	0	0.05			3.0×10^6		3.0×10^7	2.0×10^7	14	Primarily heavy ions
B2	<9		6									Test Beam, Commission FY93
C1	1-20	5	0	0.8	3.0×10^7	3.5×10^6	1.0×10^9	0.7×10^6	3.5×10^8	2.5×10^8	13	L=61m, "OR" w/C5
C5*	1-28	2	0	0.15			1.0×10^8				13	L=81m, Primarily heavy ions
Neutral Beams												
B5	2-15		1-4.5	0.1			K_L^0 flux = 5.0×10^8			2-15	$n/K_L^0 = 6$	L=10m, "OR" w/B1
Muon Channel												
D2	0.25-15	9(π) 30(μ)	135(π)	24(π)			μ^+ flux = 2.0×10^6					Commission in FY93
							Surface μ^+ flux = 2.0×10^6					
Neutrino Beam												
U							ν flux = $2.0 \times 10^{10}/m^2$ Wide Band					FEB flux avg. over 1.5m R.
							$\bar{\nu}$ flux = $1.4 \times 10^{10}/m^2$ Wide Band					$\langle E \rangle = 1.4 GeV/c^2$ Wide Band
g-2 π-μ Transfer Line												
V1	<3.0	0.6	0				π^+ flux = 1.6×10^9			3.0		L=120m, for injection to g-2 ring
							μ^+ flux = 7.3×10^5					Commission in FY96, fast spill

* These 0° beam lines can be used for full energy polarized protons and/or heavy ion beams

AGS SCHEDULE AS RUN

BY: L. RATNER
DATE: 9-24-92

FY1992

RUNNING
PARASTIC RUNNING
SUBJECT TO APC APPROVAL
FACILITY COMMISSIONING

AGS MODE		S												S	
		OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUG	SEPT		
EXP. NO.	EXPERIMENTER	HRS.													
A1	TEST														
A2	BEAM														
A3	TEST														
A3	BEAM														
A3	NASA	29													
A3	CRAWFORD	407													
A3	CHUNG/DZIERBA	333													
A3	PRICE	21													
A3	OTTERLUND	27													
A3	WADDINGTON	27													
A3	JAIN	27													
A3	HEINRICH	27													
A	CUMMING	32													
A	PERERA	13													
A	HILL	39													
B1	HILL	38													
B1	TEST														
B1	BEAM														
B1	WADDINGTON	41													
B1	REMSBERG/ZAJO	1644													
B1	CHASMAN/STEADMAN	118													
B2	LINDENBAUM	87													
B5	MOLZON/RITCHIE	787													
B5	WOLCICKI	2400													
B5	COUSINS/SCHWARTZ	401													
C1	CARROLL/HEPPELMAN	889													
C2	LITTENBERG/SMITH	6391													
C5	BRYMAN	162													
C5	BRAUN-MUNZINGER	142													
C5	BRAUN-MUNZINGER	142													
C5	WOODY	1100													
C6	MAY/DEUTSCH	1107													
C6	PETERSON/HUNGERFORD/SHRIEN	383													
C6	NEFKENS	30													
C6	ETA														
D6	BARNES/FRANKLIN	1428													
D6	INAIL/PILE	283													
D6	ZUCKER	4.9													

AGS MODES

SEB = SLOWLY EXTRACTED BEAM
 FEB = FAST EXTRACTED BEAM
 SEB = SINGLE BUNCH EXTRACTION
 PP = POLARIZED PROTONS
 H = HKS AT 14.5 GeV
 S = SHUTDOWN
 • = STARTUP

(1) AGS AND BOOSTER COMMISSIONING

(2) AGS AND BOOSTER COMMISSIONING
CONTINUED THROUGHOUT THE SEB RUN
WITH SOME INTERRUPTION TO THE PROGRAM

FY1993-94 AGS SCHEDULE (PRELIMINARY)

BY: P. P. L.
DATE: 4-1-93

- SUBJECT TO CHANGE -
(100 HOURS PER WEEK)

FACILITY COMMISSIONING
SUBJECT TO APC
APPROVAL

RUNNING
PARASITIC RUNNING

1994

1993

List of Experiments

Experiment	Collaboration Spokesman	Experiment Title	Page
774	Houston/BNL/New Mexico/Vassar <i>Hungerford</i>	Search for Σ -Hypernuclear Levels in ${}^4\text{He}$	13
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787	BNL/INS-Tokyo/KEK/Princeton/TRIUMF <i>Bryman, Littenberg, Smith</i>	A Study of the Decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$	17
788	Carnegie-Mellon/BNL/Houston/New Mexico/Vassar <i>Barnes and Franklin</i>	The Four Fermion Weak Interaction and the Decay ${}^4_{\Lambda}\text{He}$ and ${}^5_{\Lambda}\text{He}$	19
791	UC-Irvine/UC-Los Angeles/LANL/Pennsylvania/Stanford/Temple/William and Mary <i>Cousins and Molzon</i>	A Study of Very Rare K_L Decays	21
794	Michigan/BNL/Maryland/Notre Dame/DOE/Rice/Texas A&M/TRIUMF/ETH-Zurich <i>Krisch</i>	One-Spin Effects in $p+p \rightarrow p + p$ at High- $P_{\perp}^2$	23
810	BNL/CCNY/Johns Hopkins/Rice <i>Lindenbaum and Platner</i>	A Search for Quark Matter (QGP) and Other New Phenomena Utilizing Heavy Ion Collisions at the AGS	25
813	Carnegie-Mellon/Birmingham/BNL/Freiburg/IUCF/Kyoto/Kyoto-Sangyo/Manitoba/New Mexico/CEN Saclay/TRIUMF/Vassar <i>Franklin and Barnes</i>	Search for a Strangeness -2 Dibaryon	27

Experiment	Collaboration Spokesman	Experiment Title	Page
814	BNL/CERN/LANL/McGill/New Mexico/Pittsburgh/SUNY Stony Brook/Tel-Aviv/Texas A&M/Yale <i>Braun-Munzinger</i>	Study of Extreme Peripheral Collisions and of the Transition from Peripheral to Central Collisions in Reactions Induced by Relativistic Heavy Ions	29
817	Rice/BNL/Johns Hopkins/Minnesota <i>Bonner and Roberts</i>	Polarization Transfer in Hyperon Production	31
818	BNL/Indiana/UMass-Dartmouth/Rice <i>Chung</i>	Search for a J^{PC} -Exotic Hybrid Meson	33
821	Boston/BNL/Cornell/Fairfield/Heidelberg/Illinois/LANL/Max Planck/Tokyo/KEK/Riken/INP-Novosibirsk/Yale <i>Hughes, Morse, and Roberts</i>	A New Precision Measurement of the Muon g-2 Value at the Level of 0.35 PPM	35
835	Tel-Aviv/BNL/Texas A&M/Vassar/TRIUMF <i>Piasezky and Chrien</i>	Kaon-Nucleus Total Cross Section Measurements and Partial Deconfinement in Nuclei	37
836	Birmingham/BNL/Carnegie-Mellon/Freiburg/Kyoto/Kyoto-Sangyo/IUCF/Manitoba/New Mexico/CEN Saclay/TRIUMF/Vassar <i>Franklin and Barnes</i>	Search for a Strangeness -2 Dibaryon Using a ^3He Target	39
840	Rochester/BNL/Fermilab/Trieste <i>Melissinos</i>	A Search for the Coherent Production of Light Scalar and Pseudo-scalar Particles	41
844	BNL/Oregon State <i>Cumming</i>	Measurement of Angular Distributions for Fragments in the Target Rapidity Region	43

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850	BNL/Michigan/Minnesota/Mt. Holyoke/Penn State/UMass-Dartmouth/Tel-Aviv <i>Carroll and Heppelmann</i>	EVA, A Solenoidal Detector for Large Angle Exclusive Reactions. E850: Determining Color Transparency to 22 GeV/c	47
852	BNL/Indiana/Louisville/UMass-Dartmouth/Notre Dame/Moscow <i>Chung and Dzierba</i>	Search for Mesons with Unusual Quantum Numbers	49
854	Rice/BNL/CCNY/Johns Hopkins/UC-Los Angeles/Maryland <i>Bonner</i>	Antiproton-Nucleus Interactions at 5-10 GeV/c	51
855	BNL/ORNL/CERN/Vanderbilt <i>Woody and Shapira</i>	Proposal to Study Low Energy Photon Production in Proton Nucleus Collisions at the AGS	53
856	BNL/Bloomsburg/Case Western Reserve/Harvard Cyclotron Lab/Loma Linda/Mass/Syracuse/SUNY Health Science Center <i>Kalogeropoulos</i>	Exploration of the Biomedical Potential of Antiprotons	55
858	UC-SSL/Boston/BNL/UC-Los Angeles/KEK/Waseda/Tokyo/Johns Hopkins/Louisiana/LBL/Columbia <i>Crawford</i>	Measurement of Negative Particle Yield at 0° for 15A GeV Si + Au Collisions	57
859	ANL/BNL/Columbia/Hiroshima/Tokyo-INS/Kyushu/LLNL/MIT/UC-SSL/UC-Riverside/Tokyo <i>Ledoux and Remsberg</i>	Studies of High-Density Baryon Matter from Extended Measurements of Particle Momentum Distributions and from High-Precision Two-Particle Correlations	59
862	Iowa State/BNL/Michigan State <i>Hill</i>	Electromagnetic Dissociation of ^{59}Co and ^{197}Au by ^{139}La and ^{197}Au	61

Experiment	Collaboration Spokesman	Experiment Title	Page
863	Alma Alta/Beijing/LBL/Carleton/ Panjab/Hunan Ed Inst/JINR Dubna/Jaipur/Jammu/Khlopin Radium Inst/Shanxi Normal/ Lund/Phillips/Lebedev Inst/ Washington/Inst Nuclear Phys. Tashkent/Physical-Tech Inst Tashkent/Hua-Zhong Normal/ Yerevan Phys Inst <i>Wilkes (U.S.) and Otterlund (Overall)</i>	Au Beam Exposures for E815 (Particle Production and Nuclear Fragmentation in Col- lisions of Heavy Ions in Nuclear Targets at AGS Energies)	63
864	BNL/Iowa St/MIT/Penn St/ Purdue/Bari/Massachusetts/ Wayne St/Yale <i>Sandweiss</i>	Production of Rare Composite Objects in Relativistic Heavy Ion Collisions	65
865	BNL/Connecticut/INR-Moscow/ JINR-Dubna/New Mexico/PSI/ Basel/Pittsburgh/Tbilisi State/ Yale/Zurich <i>Zeller</i>	Proposal to perform an improved search for the decay $K^+ \rightarrow \pi^+ \mu^+ e^-$	67
866	ANL/BNL/Columbia/Hiroshima/ INS-Tokyo/Kyoto/Kyushu/LLL/ MIT/UC-SSL/UC-Riverside/Tokyo Tsukuba <i>Chasman and Hamagaki</i>	Studies of Particle Production at High Baryon Density Using the the Au Beam	69
868	Minnesota/Louisiana State/INP- Krakow/ITEP Moscow <i>Waddington</i>	E808-Interactions of 14.1 GeV/nucleon nuclei from ^{16}O to ^{197}Au in light and heavy targets	71
869	Minnesota/Washington/Caltech <i>Waddington</i>	Measurement of Fragment Yields for 14 GeV/nucleon Au + X Collisions	73

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874	Colorado/Houston/BNL <i>Chrien, Hungerford, Peterson</i>	Kaon-Nucleus Quasielastic and Elastic Scattering at 720 MeV/c	77
875	SUNY - Buffalo <i>Jain</i>	Study of Particle Production and Nuclear Fragmentation in Rela- tivistic Heavy-Ion Collisions in Nuclear Emulsions	79
876	William & Mary/Virginia St/ G. Mason/Columbia <i>Kossler</i>	μ^+ Surface Beam Characterization	81
877	BNL/GSI Darmstadt/McGill/New Mexico/Pittsburgh/Sao Paulo/ SUNY-Stony Brook/Texas A&M <i>Braun-Munzinger</i>	Study of Relativistic Nuclear Col- lisions with Heavy Beams using the E814 4π Calorimetry and Modified Forward Spectrometer	83
878	UC-SSL/BNL/UC-Los Angeles/ KEK/Waseda/Johns Hopkins/ Tokyo/LBL/Columbia/University Space Research Assn. <i>Crawford</i>	Investigation of Antinucleus Pro- duction and Search for New Particles in Nucleus-Nucleus Collisions at the AGS	85
880	Indiana/BNL/ANL/TRIUMF/ Fermilab/KEK <i>Lee and Ratner</i>	The Effects of a Partial Siberian Snake on Polarization at the AGS	87
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883	University of Siegen <i>Heinrich</i>	Fragmentation of Au-Projectiles at AGS Energies	93
884	Univ. of Pittsburgh <i>Perera</i>	An Experiment to Enhance Fractional Charge Impurities (FCI) in Semiconductors to be Used in an Optoelectronic Search for FCIs	95
885	BNL/Carnegie-Mellon/Kyoto/ Kyoto-Sangyo/Manitoba/New Mexico/TRIUMF/Vassar <i>May and Franklin</i>	Experiment to Detect $\Lambda\Lambda$ Hypernuclei	97
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887	BNL/CEBAF/Houston/Indiana/ INS/Ohio State/Tokyo <i>Sawafu</i>	Do Narrow Σ Hypernuclear States Exist?	101
888	BNL/UC-Irvine/UC-Los Angeles/ Princeton/Stanford/Temple/ UTexas at Austin/William and Mary <i>Cousins and Schwartz</i>	Search for the H Dibaryon	103
890	UC-Los Angeles/BNL/LANL/ Forschungszentrum Jülich/Ruder Boskovic Institute <i>Nefkens, Chrien and Peng</i>	A New Test of Charged Symmetry in Eta Production on Deuterium	105

Summaries

of

Experiments

Beam: C6
Status: Complete in 1991
Approved Hours: 1250

Experiment 774 - Search for Σ -Hypernuclear Levels in ^4He

University of Houston

E.V. Hungerford, B.W. Mayes, H. Piekarz, L.S. Pinsky

Brookhaven National Laboratory S. Bart, R. Chrien, P. Pile

University of New Mexico

B. Bassalleck

Vassar College

R. Stearns

Spokesman:

E.V. Hungerford

The question of narrow (2 MeV) structure in sigma hypernuclei is not completely resolved. This structure is much narrower than theoretical estimates which range from 13 to 80 MeV, and has led to much theoretical speculation as to a mechanism that could suppress the strong conversion process, $\Sigma N \rightarrow \Lambda N$, within the nucleus. The $^{12}_{\Sigma}\text{B}$ spectrum has been measured in E774. Earlier published results indicated narrow peaks (2 MeV) in the spectrum. There is no evidence for this structure in this data. All the spectra are reminiscent of final state enhancements and very similar to a spectrum calculated using the continuum shell model. In addition, there is no significant structure below threshold which should be evident if the strong conversion width is suppressed. Thus, the extraction of a sigma spin-orbit strength from these data, as has been previously done, is probably incorrect. This leaves open the whole question of a sigma spin-orbit interaction.

Data is in the final stages of analysis with publication expected in the near future.

The BNL Hypernuclear Spectrometer System as configured during the initial running phase of E781. Since then the Pion Spectrometer has been moved from the LESB-I beam line to the LESB-II beam line. The Kaon Spectrometer is now comprised of the end elements of LESB-II. The target is surrounded with either intrinsic germanium detectors or NaI detectors.

***Experiment 781 - Spin Dependence of the Lambda Nucleus Interaction
Determined by Observation of Hypernuclear Gamma Rays***

Brookhaven National Laboratory S. Bart, R.E. Chrien, M. May, P. Pile

**Massachusetts Institute
of Technology** M. Deutsch

University of Houston E.V. Hungerford, B. Mayes, L. Pinsky

Carnegie-Mellon University P. Barnes

Vassar College R.L. Stearns

New York University B. Budick

Spokesmen: M. Deutsch and M. May

This is a proposal to measure the γ -ray transitions between hypernuclear states which differ only by the orientation of the Λ spin with respect to the angular momentum of the nuclear core. This directly measures the spin dependence of the Λ nucleus interaction independent of any model. We expect these spin dependent splittings to be less than 300 keV. Germanium detectors will be used to observe the γ rays in coincidence with a pure sample of hypernuclear events in a narrow range of excitation energy selected by the hypernuclear spectrometer in LESBI at the AGS. This proposal continues the research begun in Experiment 760, the first experiment to utilize this $(K\pi, \gamma)$ coincidence technique. The probable energy range of the γ rays to be observed is inferred from the results of Experiment 760 and is very much lower than previous theoretical estimates.

Beam: C4
Status: In progress
Hours Charged/Approved: 6391/10500

Experiment 787 - A Study of the Decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$

Brookhaven National Laboratory	S. Adler, M.S. Atiya, I-H. Chiang, J.S. Frank, J.S. Haggerty, S. Kettell, T.F. Kycia, K.K. Li, L.S. Littenberg, A.J. Stevens, R.C. Strand, C. Witzig
INS-Tokyo	T. Komatsubara, H. Okumo, S. Sugimoto, K. Ukai
KEK	T. Inagaki, S. Kabe, M. Kobayashi, Y. Kuno, T. Sato, T. Shinkawa, Y. Yoshimura
Princeton University	M. Ardebili, M. Convery, C. Denniston, M.M. Ito, D.R. Marlow, R. McPherson, P.D. Meyers, E. Prebys, F.C. Shoemaker, A.J.S. Smith
TRIUMF	E.W. Blackmore, D.A. Bryman, L. Felawka, P. Kitching, A. Konaka, Y. Kuno, J.A. Macdonald, T. Nakano, T. Numao, V. Pacradouni, P. Padley, J.-M. Poutissou, G. Redlinger, J. Roy, M. Rozon, R. Soluk, A.S. Turcot
Spokesmen:	D.A. Bryman, L.S. Littenberg, A.J.S. Smith

Experiment 787 is a search for reactions of the type $K^+ \rightarrow \pi^+ XX$, where X is a weakly interacting light neutral particle. The experiment is sensitive to such decays at the 10^{-10} level. The prime candidate is $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ which provides a uniquely stringent test of the Standard Model and its parameters because it is the only experimentally accessible process that is dominated by an unambiguously calculable higher order weak interaction. Two body decays $K^+ \rightarrow \pi^+ X$ are also searched for to place constraints on the existence of a variety of hypothetical particles such as axions, familons, hyperphotons and supersymmetric neutrals predicted by extensions to the SM. Several other rare decays including $K^+ \rightarrow \pi^+ \gamma \gamma$, $K^+ \rightarrow \pi^+ \mu^+ \mu^-$, $\pi^0 \rightarrow \nu \bar{\nu}$ and $\pi^0 \rightarrow \gamma XX$ are also being investigated.

APPARATUS

The placement of the out-of-beam detector arrays are illustrated in this plan view design drawing. A charged particle's velocity is measured from the time of flight between SL/R and L/RK. The L/RV charge-particle veto maximized the neutron detection volume by tagging charged tracks destined to the L/RN. The L/RN layers are composed of 50 elements with an active volume of about 700 liters for each side.

***Experiment 788 - The Four Fermion Weak Interaction
 and the Decay of ${}^4_{\Lambda}\text{He}$ and ${}^5_{\Lambda}\text{He}$***

Carnegie-Mellon University	M.J. Athanas, P.D. Barnes, G. Diebold, G. Franklin, F. Merrill, B. Quinn, F. Rozon, R. Schumacher, I. Sukaton, V. Zeps.
Brookhaven National Laboratory	S. Bart, R. Chrien, K. Johnson, P. Pile, R. Sawafta, R. Sutter
University of New Mexico	B. Bassalleck
Indiana University Cyclotron Facility	J. Szymanski
Vassar College	R. Stearns
Spokesmen:	P.D. Barnes and G. Franklin

This experiment studies the four fermion weak interaction through investigation of the $\Lambda N \rightarrow NN$ interaction as manifested in the weak decay of hypernuclei. Using the $K^- + A \rightarrow \pi^- + {}_{\Lambda}A$ reaction to form ${}^4_{\Lambda}\text{He}$ and ${}^5_{\Lambda}\text{He}$, the measurements determine the lifetime and the four partial decay rates that characterize the weak decay. Because the Λ and the nucleons are all in relative s states, one can extract from the decay rates information on the elementary $\Lambda N \rightarrow NN$ spin-isospin amplitudes.

The AGS hypernuclear spectrometer at the separated kaon beam, LESBI, was used to tag the formation of ${}^4_{\Lambda}\text{He}$ and ${}^5_{\Lambda}\text{He}$. The time spectrum and energy distribution of pions, protons and neutrons were measured with a scintillator array which functions as a range stack and time-of-flight neutron spectrometer. Previous data of this type is either non-existent or of very poor quality. The lifetime measurement was based on the coincident proton spectrum with a system that has been demonstrated to be capable of $\sigma \approx 100$ ps prompt time resolution.

A plan view of the experimental apparatus. The beam defining elements are not shown.

<i>Experiment 791 - A Study of Very Rare K_L Decays</i>

**University of California
Irvine**

C. Mathiazhagen, W.R. Molzon

**University of California
Los Angeles**

R.D. Cousins, J. Konigsberg, J. Kubic, P. Melese,
P. Rubin, W.E. Slater, D. Wagner

Los Alamos National Laboratory

G. Hart, W.W. Kinnison, D.M. Lee, R.J. McKee,
E.C. Milner, G.H. Sanders, H.J. Ziock

University of Pennsylvania

K. Arisaka, P. Knibbe, J. Urheim

Stanford University

S. Axelrod, K. Biery, G. Irwin, K. Lang, J. Margulies,
D. Ouimette, J. Ritchie, Q. Trang, S.G. Wojcicki

Temple University

L.B. Auerbach, J. Belz, P. Buchholz, C. Guss,
V.L. Highland, S. Kettell, W.K. McFarlane, M. Sivertz,
C. Zhang

College of William and Mary

M. Chapman, M. Eckhause, J. Ginkel, D. Joyce,
J.R. Kane, C. Kenney, W.F. Vulcan, R.E. Welsh,
R.J. Whyley, R.G. Winter

Spokesmen:

R.D. Cousins and W.R. Molzon

This experiment investigated rare K_L^0 decays, emphasizing a search for non-conservation of separate lepton number as manifested by the decay $K_L^0 \rightarrow \mu e$. Final results include an upper limit of 3.3×10^{-11} (90% C.L.) for the decay $K_L^0 \rightarrow \mu e$. A slightly weaker limit for $K_L^0 \rightarrow e^+ e^-$ is in preparation. Preliminary result for the branching ratio for $K_L^0 \rightarrow \mu^+ \mu^-$, based on over 700 events, is $(6.86 \pm 0.37) \times 10^{-9}$.

Experiment 794 - One-Spin Effects in $p + p \rightarrow p + p$ at High- $P_{\perp}^2$

University of Michigan

P.R. Cameron, G.R. Court, D.G. Crabb, G. DeMuth,
 I. Gialas, W.A. Kaufman, F.Z. Khiari, A.D. Krisch,
 A.M.T. Lin, R.A. Phelps, R.R. Raylman, R.S. Raymond,
 T. Roser, J.A. Stewart, K.M. Terwilliger,¹ B.S. Van
 Guilder, B. Vuaridel, V.K. Wong

Brookhaven National Laboratory K.A. Brown, G.T. Danby, L.G. Ratner

University of Maryland

D.C. Peaslee

**University of Notre Dame/
 US DOE**

J.R. O'Fallon

Rice University

J.B. Roberts

Texas A&M University

T.S. Bhatia, G. Glass, L.C. Northcliff

TRIUMF

C.A. Miller, M.C. Vetterli

ETH, Zurich

M. Simonius

Spokesman:

A.D. Krisch

¹ Deceased.

The experimenters scattered a high intensity unpolarized proton beam from a polarized proton target and measured the left-right asymmetry (Analyzing Power) in proton-proton elastic scattering. The elastic differential cross-sections in different initial spin states in the large- $P_{\perp}^2$ region from 2.8 to 7.1 (GeV/c)² was measured. The physics motivation was both to study the totally unexplored area beyond $P_{\perp}^2 = 6.5$ (GeV/c)² and to improve on the precision of measurements out to $P_{\perp}^2 = 6.5$ (GeV/c)², where AGS experiment E748 previously found a huge and unexpected value of A. The experiment observed with good precision that A continues to rise in this previously unexplored hard-scattering region.

810

The three TPC modules shown in the MPS magnetic field have 12 rows of anode readout wires. Each row is spaced 3.8 cm apart and consists of 256 short anode wires 1 cm of length along the beam direction and with 2.54 mm spacing between wires. The wire number gives the X, Z coordinates and the drift time gives the Y coordinate for unambiguous 3-D point determination. Greater than 120 Si-on-Au track events have been pattern recognized with good efficiencies. Lambdas have been observed. The drift region in each of three modules is 60 cm high by 65 cm wide by 47 cm long. A time-of-flight wall (not shown) identifies anti-protons.

Beam: A1
Status: Complete in 1991
HoursCharged/Approved: 2074/2350

Experiment 810 - A Search for Quark Matter (QGP) and Other New Phenomena Utilizing Heavy Ion Collisions at the AGS

Brookhaven National Laboratory A. Etkin, K.J. Foley, R.W. Hackenburg, R.S. Longacre,
W.A. Love, E.D. Platner, A.C. Saulys

City College of New York and S.J. Lindenbaum
Brookhaven National Laboratory

City College of New York C.S. Chan, E. Efstathiadis, M.A. Kramer, K. Zhao, Y. Zhu

Johns Hopkins University T. Hallman, L. Madansky

Rice University S. Ahmad, B.E. Bonner, J.A. Buchanan, C.N. Chiou,
J.M. Clement, G.S. Mutchler

Spokesmen: S.J. Lindenbaum and E.D. Platner

Heavy ion collisions have been studied at the AGS by measuring the angles and momenta of virtually all charged particles emitted in each event for the forward half of the rapidity range in the n-n cross section. Particle identification is approximately accomplished by assuming negative particles are "pions" and positives-negatives are $\approx$ "protons."

We have found increasing stopping of 14.5 GeV/c Si ions in Si, Cu and Pb targets respectively with near maximal stopping occurring in Pb. We have observed larger K_S^0 and Λ production than simple cascade models predict but including many secondary interactions in the cascade explains the major features of our results except for the transverse momentum spectrum. We have observed and are also studying multi- Λ (2-3) and multi- K_S^0 events. We found a higher exponential slope at low $p_\perp$ for pions. We are also searching for strangelet candidates.

813

Schematic of Apparatus

Experiment 813 - Search for a Strangeness -2 Dibaryon

Carnegie-Mellon University	M. Athanas, P. Barnes, G. Diebold, G. Franklin, C. Maher, B. Quinn, M. Rozon, R. Schumacher, I. Sukaton, V. Zeps
University of Birmingham	J. Lowe, J. Nelson, R. Zybert
Brookhaven National Laboratory	S. Bart, R. Chrien, P. Pile, R. Sawafta, R. Sutter
Freiburg University	P. Birien, T. Buerger, J. Franz, N. Hamann, ¹ E. Rössle, H. Schmitt
Indiana University Cyclotron Facility	J. Szymanski
University of Kyoto	T. Iijima, K. Imai, A. Masaie, K. Miyake
University of Kyoto-Sangyo	K. Okada, F. Takeuchi
University of Manitoba	A. Berdoz, D. Davis, N. Davison, S. Page, D. Ramsay, V. Sum, W. van Oers
University of New Mexico	B. Bassalleck, A. Rusek, D. Wolfe
CEN, Saclay	P. Birien
TRIUMF	D. Gill
Vassar College	R.L. Stearns
Spokesmen:	G. Franklin and P.D. Barnes

Motivated by Jaffe's 1977 prediction of a six-quark object with strangeness -2 and $J^{\pi} = 0^{+}$ at a mass of 2150, this experiment proposes to study the strangeness -2 two-baryon mass spectrum from 100 MeV below the mass of the lightest known two-baryon strangeness -2 system, $\Lambda\Lambda$ mass. This particle, called the "H", has been predicted by later bag models as well. Although the mass calculation is model dependent, the predictions are considered within the expected range of sensitivity. The possibility of resonances near the $\Lambda\Lambda$ mass due to conventional meson exchange forces can also be explored since the experiment covers the region both above and below the $\Lambda\Lambda$ mass.

¹ Located at CERN.

***Experiment 814 - Study of Extreme Peripheral Collisions and of the
 Transition from Peripheral to Central Collisions in Reactions Induced by
 Relativistic Heavy Ions***

Brookhaven National Laboratory	M. Fatyga, D. Lissauer, T. Ludlam, S. McCorkle, E. O'Brien, H. Takai, T. Throwe, C. Woody
GSI, Darmstadt	N. Herrmann
Los Alamos National Laboratory	D. Fox, J. Simon-Gillo
McGill University	J. Barrette, S. Gilbert, R. Lacasse, S.K. Mark, M. Rosati, G. Wang
University of New Mexico	D. Wolfe
University of Pittsburgh	W. Cleland, K. Jayananda, D. Kraus, U. Sonnadara, Z. Zhang
University of São Paulo	N. DaSilva, O. Dietzsch, M. Takagui
State University of New York, Stony Brook	P. Braun-Munzinger, G. David, J. Dee, T. Hemmick, B. Hong, W. Llope, M. Rao, J. Stachel, L. Waters, N. Xu, Y.C. Zhang, C. Zou
Texas A&M University	K. Wolf
Wayne State University	R. Bellwied, S. Bennett, T. Cormier, J. Hall, Q. Li, A. Lukaszew, R. Matheus, C. Pruneau
Yale University	S.V. Greene, R. Majka, J. Mitchell, F. Rotondo, J. Sandweiss, S. Kumar
Spokesman:	P. Braun-Munzinger

Experiment 814 combines 4π calorimeter coverage with a high resolution forward spectrometer. Extreme peripheral collisions are investigated by making an exclusive study of projectile fragmentation processes induced by Coulomb excitation. Central collision, including transverse energy and charged particle multiplicity production and a search for hydrodynamic flow effects are also studied. In the forward spectrometer, spectra for protons, neutrons and eventually, pions and kaons are measured to provide a detailed picture of the stopping process. A search is made for neutral particles, possibly produced in central collisions. The possible production of strange matter in such collisions is studied. The target area calorimetry provides a reaction trigger while fragments are identified in the forward spectrometer by their momentum/charge, Time-Of-Flight, specific energy loss and kinetic energy. This includes a measurement of anti-proton production and a search for anti-nucleus production in such collisions.

EXPERIMENTAL LAYOUT for E-817

Beam: A1
Status: Awaiting Polarized Proton Run
Approved Hours: 1300

<i>Experiment 817 - Polarization Transfer in Hyperon Production</i>
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Rice University

D.L. Adams, S. Ahmad, B.E. Bonner, J.A. Buchanan,
J.M. Clement, M.D. Corcoran, H.E. Miettinen,
G.S. Mutchler, J.B. Roberts, J. Skeens, P.M. Stevenson

Brookhaven National Laboratory S.U. Chung, H. Willutz
ki

Johns Hopkins University

T. Hallman, L. Madansky

University of Minnesota

K.A. Johns

Spokesmen:

B.E. Bonner and J.B. Roberts

Since the discovery that inclusively produced hyperons are polarized, the underlying cause of the effect has remained a mystery. No perturbative QCD predictions are possible for the kinematic range covered by experiment, but simple parton-based theories that explain the effect in terms of breaking of strings or Thomas precession of strongly accelerated quarks have had a remarkable degree of success in explaining the effect. This experiment aims to measure the hyperon polarization when produced by a polarized proton beam. The question being addressed is how much the hyperon polarization is influenced by that of the proton. The experiment has been performed for the case of lambdas produced by polarized protons at 13 and 18 GeV/c. In rough agreement with the model, the lambda polarization is independent of that of the proton ($D_{NN} \approx 0$) and the left-right asymmetry for lambda production is also near zero. A first measurement of these quantities for Σ^0 production has shown large deviations from the predictions of the model. We expect to continue the Σ^0 experiment to be able to make a definitive test of an extended model which we have proposed.

818

Beam: A1
Status: Complete in 1990
Hours Charged/Approved: 1156/1150

<p><i>Experiment 818 - Search for a J^{PC} - Exotic Hybrid Meson</i></p>
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Brookhaven National Laboratory S.U. Chung, H. Kirk, S.D. Protopopescu

Indiana University R. Crittenden, A. Dzierba, T. Marshall, D. Zieminska

**University of Massachusetts-
Dartmouth** N. Bar-Yam, J. Dowd, W. Kern, E. King

Rice University B.E. Bonner, G. Mutchler, J.B. Roberts

Spokesman: S.U. Chung

The aim of this experiment is to look for a J^{PC} -exotic meson which cannot couple to a quarkonium. Such a state is expected as a hybrid meson composed of a $q\bar{q}$ in color octet - and a valence gluon. In particular, a hybrid meson with $J^{PC} = 1^\pm$ and $I = 1$ is supposed to decay into the channels $D(1285)\pi$ and $B(1235)\pi$.

G-2 $\pi^- \mu^-$ BEAM

Momentum Bands

$\pi^- : \sigma = \pm 0.36\%$

$\mu^- : \sigma = \pm 0.42\%$

Flux @ Inflector Exit

$1.2 \cdot 10^7 \pi^+ / 10^{12} \text{ prot on targ}$

$7.2 \cdot 10^4 \mu^+ / 10^{12} \text{ " " "}$

<i>Experiment 821 - A New Precision Measurement of the Muon $g-2$ Value at the Level of 0.35 PPM</i>

Boston University	D.H. Brown, R.M. Carey, E. Hazen, F. Krienen, J.P. Miller, B.L. Roberts, L.R. Sulak, C. Wang, W. Worstell
Brookhaven National Laboratory	G. Bennett, H.N. Brown, G. Bunce, J.R. Cullen, Jr., G.T. Danby, D. Hseuh, J.W. Jackson, R. Larsen, Y.Y. Lee, S. Mane, W.-Z. Meng, W. Morse, A. Prodell, S. Rankowitz, Y. Semertzidis, R. Shutt, P.A. Thompson, K. Woodle
Cornell University	T. Kinoshita, Y. Orlov
Fairfield University	D. Winn
University of Heidelberg	K. Jungmann, P. von Walter, G. zu Putlitz
University of Illinois	P. Debevec, P. Harris, D. Hertzog, T. Jones, R. Reinhart, M. Rhodes, J. Ritter
Los Alamos National Laboratory	W.P. Lysenko
Max Planck Institut fur Med. Forschung, Heidelberg	U. Haeberlen
University of Tokyo	M. Iwasaki, K. Nagamine
National Laboratory for High Energy Physics (KEK)	K. Endo, H. Hirabayashi, S. Ichii, S. Kurokawa, K. Mashata, Y. Mizumachi, S. Sakamoto, T. Sato, A. Yamamoto
University of Riken	K. Ishida
Institute for Nuclear Physics, Novosibirsk	L.M. Barkov, D.N. Grigoriev, B.I. Khazin, E.A. Kuraev, S.I. Redin, Ya. M. Shatunov, E. Solodov
Yale University	H. Ahn, P. Cushman, S.K. Dhawan, F.J.M. Farley, X. Fei, S. Hou, V.W. Hughes
Spokesmen:	V.W. Hughes, W.M. Morse, B.L. Roberts

The anomalous gyromagnetic ratio of the muon ($g-2$) will be measured to 0.36 ppm or a factor of 20 times better than it is currently known. The predicted contribution to ($g-2$) from the first order $W^\pm$ and Z^0 radiative correction is predicted to be 1.7 ppm so this experiment will provide a direct test of the electroweak radiative correction, and hence of the renormalizability of the Glashow-Weinberg-Salam theory. Since a_μ is sensitive to a wide range of non-standard model effects, there is a window in which to search for new physics. W or muon substructure, supersymmetry and the existence of new gauge bosons are several possibilities. A 14m diameter superferric muon storage ring is under construction and will be complete by 1994. The plan is to be ready for data collection in FY 1995.

***Experiment 835 - Kaon-Nucleus Total Cross Section Measurements
and Partial Deconfinement in Nuclei***

Tel-Aviv University	J. Alster, D. Ashery, J. Lichtenstadt, Y. Mardor, M.A. Moinester, E. Piasetzky, R. Weise, A.I. Yavin
Brookhaven National Laboratory	S. Bart, R.E. Chrien, T. Kishimoto, P.H. Pile, R. Sawafu, R.J. Sutter
Texas A&M University	R.C. Hiebert, R.A. Krauss
Vassar College	R.L. Stearns
TRIUMF	R.R. Johnson, R. Olshevsky
Spokesmen:	E. Piasetzky and R.E. Chrien

The classical view of nuclear physics is that nucleons in nuclei have the same properties as free nucleons. This approach has had substantial success; however, recent data, as well as some problems in low energy nuclear physics have led to a suggestion that the size of the nucleon increases inside the nucleus, as a consequence of a change in quark-deconfinement scale. It is important to test the hypothesis in a different momentum regime and with a different probe. A measurement of the ratio of K^+ -nucleus to K^+ -deuteron total cross section is proposed. This ratio is predicted to be sensitive to the proposed change in the radius of the nucleon in the nucleus.

836

Experimental apparatus for ^3He target H particle search.

***Experiment 836 - Search for a Strangeness -2 Dibaryon
 Using a ^3He Target***

University of Birmingham	J. Lowe, J. Nelson, R. Zybert
Brookhaven National Laboratory	S. Bart, R. Chrien, P. Pile, R. Sawafta, R. Sutter
Carnegie-Mellon University	M. Athanas, P.D. Barnes, G. Diebold, G. Franklin, C. Maher, B. Quinn, M. Rozon, R. Schumacher, I. Sukaton, V. Zeps
Freiburg University	P. Birien, J. Franz, N. Hamann, ¹ Y.E. Rössle, H. Schmitt
University of Kyoto	T. Iijima, K. Imai, A. Masaike, K. Miyake
Kyoto Sangyo University	K. Okada, F. Takeuchi
Indiana University Cyclotron Facility	J. Szymanski
University of Manitoba	A. Berdoz, C. Davis, N. Davison, S. Page, D. Ramsay, V. Sum, W. van Oers
University of New Mexico	B. Bassalleck, A. Rusek, D. Wolfe
CEN, Saclay	P. Birien
TRIUMF	D. Gill
Vassar College	R.L. Stearns
Spokesmen:	G.B. Franklin and P.D. Barnes

The two component target, used in the $(\Xi^-, d)_{\text{atom}} \text{H}$ search of Exp. 813 will be replaced with a single ^3He target used in the reaction $\text{K}^- + ^3\text{He} \rightarrow \text{K}^+ + \text{H} + \text{n}$. With the ^3He target, greater sensitivity to a more tightly bound H is achieved. The ^3He target is to be considered a logical addition to the two component target measurement to extend the region of sensitivity to greater values of binding energy.

¹ at CERN

840

Exp. 840 anticipated sensitivity to ellipticity and rotation as a probe of axion mass and coupling constant.

***Experiment 840 - A Search for the Coherent Production of Light Scalar
and Pseudoscalar Particles***

University of Rochester

R. Cameron, A.C. Melissinos, G. Ruoso, Y.K. Semertzidis

Brookhaven National Laboratory H. Halama, D.M. Lazarus, A.G. Prodell, G. Smith

Fermilab

F.A. Nezrick

Trieste

G. Cantatore, C. Rizzo, E. Zavattini

Spokesman:

A.C. Melissinos

E840 is a non-accelerator experiment designed to search for the coherent production of low mass bosons through their coupling to two photons. An example is the axion which is a natural consequence of the breaking of the Peccei-Quinn symmetry which provides a natural explanation for the absence of CP violation in the strong interaction. Interest in the possible existence of axions has intensified as they are excellent candidates for the dark matter presumed responsible for our lack of understanding of galactic dynamics. In the coherent production experiment, the axions would make their presence known through a minute rotation of the polarization of laser light whose photons interact with the virtual photons of the field of a pair of superconducting CBA magnets. No such rotation was observed with a sensitivity of 10^{-10} radian, leading to an upper limit of $3.6 \times 10^{-7} \text{ GeV}^{-1}$ for the coupling of the two photons to axions of mass below a milli-eV. A subsequent experiment, using the same apparatus with the addition of a low noise, cooled photomultiplier tube searched for the presence of axions through regeneration of the photons in the field of the second magnet by axions produced in the first magnet that have passed through a mirror separating the two magnets. Two days of running resulted in a limit on the coupling of $7.7 \times 10^{-7} \text{ GeV}^{-1}$. Finally an attempt was made to detect a flux of so-called "hadronic axions" produced in the solar interior via the Primakoff effect. This variety of axion has no direct coupling to electrons and therefore is incapable of cooling the sun so that its age would appear much greater than observed. An AGS 18D72 dipole magnet with its axis oriented in the direction of the sun at sunset was used to convert axions into x-ray photons in a vacuum pipe mounted in its gap. An x-ray sensitive proportional wire chamber was coupled to the pipe. With the standard solar model it was determined that the coupling of these "hadronic axions" to two photons could not exceed $7.7 \times 10^{-9} \text{ GeV}^{-1}$ for axion masses less than 0.11 eV. Tests were carried out in preparation for a new polarization experiment which would be capable of directly measuring Delbruck (photon-photon) scattering for the first time.

Energy dependence of the F/B ratio determined by thick-target thick-catcher measurements for Na-24 produced in the reactions of protons and heavy ions (C, O, Ne) with Au.

Beam: A
Status: Completed 1992
Hours Charged/Approved: 32/100

***Experiment 844 - Measurement of Angular Distributions for Fragments
in the Target Rapidity Region***

Brookhaven National Laboratory D. Beavis, J.B. Cumming, P.E. Haustein, R.W. Stoenner

Oregon State University W. Loveland

Spokesman: J.B. Cumming

Angular distributions for typical light (Ar-37) and heavy (Xe-127) fragments formed by the interaction of 14.5 GeV/nucleon Si-28 with thin gold targets will be measured. Impetus for this is the observation from AGS Exp. 825 that products in the mass range 24-48 resulting from the multifragmentation of Au¹⁹⁷ by 232 GeV 0-16 are emitted preferentially backwards in the laboratory system. Such enhanced "backsplash" was unexpected on the basis of existing studies of p-nucleus collisions up to 400 GeV or of nucleus-nucleus interactions up to ~ 25 GeV.

849

TOP VIEW

SIDE VIEW

Beam: D2
Status: Test Approved
Approved Hours: 200

Experiment 849 - Search for Muonium to Antimuonium Conversion

AT&T Bell Laboratories

Spokesmen: D.R. Harshman and A.P. Mills, Jr.

This experiment proposes to search for the spontaneous conversion of muonium (M) to antimuonium ($\bar{M}$) in vacuum, by looking for the spectator orbital positron remaining after the decay of the μ^- . Important constraints will be placed on certain supersymmetric theories that allow the violation of lepton number conservation.

850

Beam: C1
 Status: In progress/construction
 Hours Charged/Approved: 631/1200

***EVA, A Solenoidal Detector for Large Angle Exclusive Reactions
 Experiment 850 - Determining Color Transparency to 22 GeV/c***

Brookhaven National Laboratory	D.S. Barton, G. Bunce, A.S. Carroll, S. Gushue, M. Kmit, D.I. Lowenstein, Y.I. Makdisi
University of Michigan	C. Rivers, G. Snow
University of Minnesota	H. Courant, K.J. Heller, K. Johns, M.L. Marshak, C. White
Mt. Holyoke College	H. Nicholson
Pennsylvania State University	S. Durant, S. Heppelmann, E. Minor, J.Y. Wu
University of Massachusetts-Dartmouth	F. Barbosa and J.J. Russell
Tel-Aviv University	J. Alster, I. Mardor, Y. Mardor, E. Piasetzky
Spokesmen:	A.S. Carroll and S. Heppelmann

In order to extend the range and sensitivity of measurements of large angle exclusives scattering, a solenoidal detector, EVA, will be build. This new detector will increase the solid angle acceptance by a factor of 20 over the existing dipole detector and provide for 1% momentum measurements of outgoing 10 GeV/c particles. The initial experiment, 850, will allow the determination of nuclear transparency up to 22 GeV/c incident proton momentum. The additional momentum constraint derived from the measurement of both outgoing protons will produce a much improved signal to noise ratio. At 6 GeV/c, the missing energy will be ~ 50 MeV, allowing a partial separation of nuclear states. The solenoidal configuration provides an excellent geometry for studying a wide variety of two-body exclusive reactions near 90° in the center of mass. For example, reactions involving the two-body decays of neutral particles

will be very interesting.

852

E852

<p><i>Experiment 852 - Search for Mesons with Unusual Quantum Numbers</i></p>

Brookhaven National Laboratory S.U. Chung, K. Olchanski, D. Weygand, H.J. Willutzki

Indiana University B.B. Brabson, R.R. Crittenden, A.R. Dzierba, J. Gunter,
 R. Lindenbusch, E. Scott, P.T. Smith, T. Sulanke, S. Teige,
 D. Zieminska, Z. Ziliak

University of Louisville C.L. Davis

**University of Massachusetts-
Dartmouth** Z. Bar-Yam, J. Dowd, W. Kern

University of Notre Dame T. Adams, J.M. Bishop, R. Cady, N.M. Cason, J. LoSecco,
 J. Manak, W.D. Shephard, D. Stienike, S. Taeger,
 D.R. Thompson

Moscow State University L. Belzer, V. Bodyagin, L. Bravina, A. Demianov,
 A. Gribushin, V. Korotkich, N. Kruglov, A. Ostrividov,
 A. Proskuryakov, L. Sarycheva, L. N. Sinyov

Spokesmen: S.U. Chung and A.R. Dzierba

Despite a number of experimental searches there is still no unambiguous candidate for a glueball, hybrid or four-quark state, although QCD predicts such objects. However, there are some tantalizing states, among them the $M^0(1405)$ which has exotic $J^{PC} = 1^{-+}$ and the scalar $G(1590)$ which has unusual branching ratios for a quark-antiquark state.

In Experiment 852, we will study these and other states, concentrating on decay modes of mesons with multi-photons and 0, 1 or 2 charged particles. The detector is built around the MPS. The target will be surrounded by a CsI veto, charged particle detectors and will be instrumented to locate interaction vertices by the detection of Cerenkov light. The target will be followed by charged particle detectors, a Cerenkov counter and a 3000-element lead glass calorimeter to detect photons from meson decays.

Fig. 1. Layout of the Multiarticle Spectrometer.

E854

Fig. 2. Beam Line Layout

Beam: A1
Status: Complete in 1991
Hours Charged/Approved: 672/644

<i>Experiment 854 - Antiproton-Nucleus Interactions at 5-10 GeV/c</i>

Rice University	S. Ahmad, B.E. Bonner, J.A. Buchanan, J.M. Clement, T. Empl, G.S. Mutchler, S. Toshkov
Brookhaven National Laboratory	S.E. Eiseman, A. Etkin, K.J. Foley, R.W. Hackenburg, R.S. Longacre, W.A. Love, T.W. Morris, E.D. Platner, A.C. Saulys
BNL and City College of New York	C. Chan, M. Kramer, S. Lindenbaum
Johns Hopkins University	L. Madansky
University of California -Los Angeles	T. Hallman
University of Maryland	D.C. Peaslee
Spokesman:	B.E. Bonner

The object of the experiment is to search for the predicted formation of hot hadronic matter by energetic antiproton absorption. This probes the high temperature-low density region of the nuclear matter phase diagram and is complementary to the low temperature-high density region being studied in heavy ion collision experiments such as AGS E810. The E854 data run occurred at the MPS facility in May-June 1991. Antiproton beams of 5, 7 and 9 GeV/c were used to interact with C, Cu, Al, Pb and Sn nuclear targets. The data analysis is in progress.

Beam: C1
Status: Complete in 1990
Hours Charged/Approved: 465/500

***Experiment 855 - Proposal to Study Low Energy Photon Production
in Proton Nucleus Collisions at the AGS***

Brookhaven National Laboratory D. Lissauer, C. Woody

Oak Ridge National Laboratory J. Gomez del Campo, A. Ray,⁺ D. Shapira, M. Tincknell*

CERN C. Erd, J. Schukraft, W. Willis

Vanderbilt University R. Clark

Spokesmen: C. Woody and D. Shapira

A systematic study of low energy photon production in proton-nucleus collisions will be made and the observed signal with the associated event topology will be correlated. This study will measure photon production down to very low P_t ($\sim$ few MeV/c) and look for new sources of "soft" photons in excess of those produced by nuclear decays and hadronic bremsstrahlung. Experiment 814 will be used as the host experiment and provide information on energy flow in order to study event correlations.

⁺ Present address, Purdue University.

^{*} Present address, VECC, Calcutta, India.

Beam:
Status: Approved pending funding
Approved Hours: 600

Experiment 856 - Exploration of the Biomedical Potential of Antiprotons

Brookhaven National Laboratory	S. Bart, G. Bennett, R. Chrien, M. Sakitt, R. Sawafter, R. Sutter
Bloomsburg University	L. Gray
Case Western Reserve University	W. Fickinger, D.K. Robinson
Harvard Cyclotron Laboratory	A. Koehler
Loma Linda University	J. Archambeau
University of Massachusetts	A.B. Brill
Syracuse University	L. Huang, T. Kalogeropoulos, J. Reed, Z. Sobolewski, K. Wang, T. Young
SUNY Health Science Center	D. Bassano, S. Manglos, S.C. Prasad
Spokesman:	T. Kalogeropoulos

The potential of antiprotons for practical applications within present antiproton collection capabilities is promising. Suggested applications include direct 3D electron density imaging, 3D multi-elemental imaging, guiding precise and easy delivery of ion beams to targets, and radiation therapy.

In this initial phase of the research, the following physics questions will be addressed: (a) Comparison of antiproton capture rates in complex targets with the Z-law; (b) Studies of the annihilation mechanism in nuclei. These studies of physics interesting on their own right will provide as well basic information in evaluating the proposed applications.

A1 and A3 lines, magnet, dipole

***Experiment 858 - Measurement of Negative Particle Yield at 0°
 for 15 A GeV Si and Au Collisions***

University of California Space Sciences Laboratory	H.J. Crawford, J. Engelage
Boston University	J. Beatty, B. Zhou
Brookhaven National Laboratory	D. Beavis, R. Debbe
University of California at Los Angeles	J. Carroll
National Laboratory for High Energy Physics (KEK)	J. Chiba, K. Tanaka
University of Waseda	T. Doke, T. Kashiwagi, J. Kikuchi
University of Tokyo	M. Aoko, R. Hayano, Y. Shimizu
Johns Hopkins University	T. Hallman
Louisiana State University	P. Kirk, L. Mao, Z. Wang
Lawrence Berkeley Laboratory	H.H. Heckman, P.J. Lindstrom
Columbia University	S. Nagamiya, P. Stankus
Spokesman:	H.J. Crawford

There is a broad range of uncertainty in the yield of anti-nuclei expected from high energy nucleus-nucleus collisions; production and survival are very sensitive to the details of the interaction region and the process of hadronization, making them a useful tool for probing this complex environment. E858 will measure the yield of $\bar{p}$'s and $\bar{d}$'s at 0° using an AGS secondary beam line to see if the yield of complex anti-nuclei is likely to be sufficient to allow a detailed study of their formation. π^- and K^- yields at 0° will also be measured for a variety of secondary rigidities between 2 and 7 GV to complement the existing measurements at larger angle and $P_{\perp}$. The experiment will have a sensitivity of $\leq 10^{-7} d\sigma^3/dp^3(\pi)$ for finding new particles produced in this rigidity range. This short experiment will determine the feasibility of a larger program aimed at characterizing rare negative particle production in heavy ion collisions.

A plan view of the present E802 apparatus.

***Experiment 859 - Studies of High-Density Baryon Matter from Extended
 Measurements of Particle Momentum Distributions and from
 High-Precision Two-Particle Correlations***

Argonne National Laboratory	S. Kaufman, F. Videbaek
Brookhaven National Laboratory	D. Beavis, C. Chasman, Z. Chen, Y.Y. Chu, J.B. Cumming, R. Debye, S. Gushue, O. Hansen, M.J. LeVine, Y. Miake, B. Moskowitz, J. Olness, L.P. Remsberg
Columbia University	I. Juricic, K. Kurita, S. Nagamiya, P. Stankus, O. Vossnack, Y. Wu, W.A. Zajc
Hiroshima University	T. Sugitate
University of Tokyo (INS)	Y. Akiba, H. Hamagaki, S. Hayashi, S. Homma, Y. Ikeda
Kyushu University	K. Kimura
Lawrence Livermore National Laboratory	H.C. Britt, N. Namboodiri, T.C. Sangster, J. Thomas
Massachusetts Institute of Technology	M.A. Bloomer, V. Cianciola, B.A. Cole, J.B. Costales, L. Grodzins, H.Z. Huang, R.J. Ledoux, D. Morrison, R.J. Morse, C.G. Parsons, M. Sarabura, R. Soltz, S.G. Steadman, G.S.F. Stephans, V. Vutsadakis, D.S. Woodruff
University of California Space Sciences Laboratory	H.J. Crawford, J. Engelage
University of California at Riverside	T. Abbott, S.-Y. Fung, J. Kang
University of Tokyo	R. Hayano, H. Sakurai
Spokesmen:	R.J. Ledoux, L.P. Remsberg

This heavy ion experiment will extend the inclusive cross section measurements of E802 over a significantly larger kinematic range and perform high-precision two-particle measurements on particles produced in nucleus-nucleus collisions. The goal is to provide a comprehensive body of data on inclusive (π , K, p, d) and two-particle correlations ($\pi\pi$, K^+K^+ and pp) which may provide insight into the formation of high density nuclear matter, its subsequent space-time evolution, source kinematics and possible thermodynamic properties.

Schematic diagram of target array for low beam intensity bombardments.

Schematic diagram of target array for high beam intensity bombardments.

Beam: A/B1
Status: In progress
Hours Charged/Approved: 35/36

***Experiment 862 - Electromagnetic Dissociation of ^{59}Co and ^{197}Au
by ^{139}La and ^{197}Au***

Iowa State University	L. Ewell, J.C. Hill, F.K. Wohn
Brookhaven National Laboratory	J.B. Cumming
Michigan State University	J.A. Winger
Spokesman:	J.C. Hill

Electromagnetic dissociation (ED) is a purely electromagnetic process occurring in relativistic heavy ion (RHI) reactions in which the Coulomb field of one of the participants generally excites a giant resonance in the other. The most likely decay channel for heavy nuclei is by one-neutron emission. ED was first reported in accelerator experiments (projectile fragmentation) by Heckman and Lindstrom and for target fragmentation by this experimental group. The ED cross section for the reaction $^{197}\text{Au}(^{139}\text{La}, X)^{196}\text{Au}$ at 1.26 GeV/nucleon was measured to be 1.97 ± 0.13 barns. The experimenters now propose to extend their measurements of the ED process to higher energies by measuring yields of target fragments from the collision of ^{139}La and ^{197}Au on ^{59}Co and ^{197}Au targets.

863

Emulsion chamber with double coated plates.

Simulated Pb-Pb event at 160 A GeV.
T=target

In E863, nuclear emulsions are used as detectors to study ultrarelativistic heavy-ion interactions. The principal aim of the experiment is to investigate global aspects of multiparticle production like the mass and energy dependence of charged particle multiplicities, angular distributions of charged particles, and target and projectile break-up. The experiment, however, also focuses on local particle density fluctuations. Indications of a Quark Gluon Plasma phase transition in terms of high overall particle densities combined with large local fluctuations are studied.

Within the collaboration two complementary techniques are used, each with its own advantages. The conventional technique with horizontally exposed stacks is predominantly used for obtaining minimum bias data, and for special studies of the target break-up. In order to gain maximal resolution in interactions of extreme multiplicities, where many particles are produced in a narrow forward cone, the use of vertically exposed emulsion chambers facilitates the measurement.

Experiment 863 - Au Beam Exposures for E815: Particle Production and Nuclear Fragmentation in Collisions of Heavy Ions in Nuclear Targets at AGS Energies

Alma Ata, Institute of High Energy Physics	N.P. Andreeva, Z.V. Anson, V.I. Bubnov, I.Y. Chasnicov, G.Z. Elighbaeva, L.E. Eremenko, A.S. Gaitinov, G.S. Kalyachkina, E.K. Kanygina, V.N. Lepetan, T.I. Shakova
Beijing, Acadmica Sinica	G.F. Xu, P.Y. Zheng
Carleton University	B. Judek (NRC, Ottawa)
Chandigarh, Panjab University	M.M. Aggarwal, R. Arora, V.S. Bhatia, I.S. Mittra
Changsha, Hunan Ed. Inst.	Y.X. Li, Z.G. Liu, L. Lu, Z.Q. Weng, Y.L. Xia
Dubna, JINR	M. Karabova, S.A. Krasnov, G.S. Shabratova, K.D. Tolstov, S. Vokal
Jaipur, University of Rajasthan	K.B. Bhalla, S.K. Gupta, V. Kumar, P. Lal, S. Lokanathan, S. Mookerjee, H.S. Palsania, R. Raniwala, S. Raniwala
University of Jammu	S.K. Badyal, A. Bhasin, S. Kachroo, G.L. Kaul, L.K. Mangotra, N.K. Rao
Leningrad, Khlopin Radium Institute	V.G. Bogdanov, V.A. Plyushev, Z.I. Solovieva
Linfen, Shanxi Normal	X. Chan, S.B. Luo, Y.M. Qin, D.H. Zhang
University of Lund	S. Garpman, B. Jacobsson, I. Otterlund, K. Soderstrom, E. Stenlund
Marburg, Phillips University	E.R. Ganssauge, E. Koch, J.T. Rhee, K. Staendecke
Moscow, Lebedev Institute	M.I. Adamovich, Y.A. Alexandrov, M.M. Chernyavski, S.G. Gerassimov, S.P. Kharlamov, V.G. Larionova, N.V. Maslennikova, G.I. Orlova, N.G. Peresadko, V.M. Rappoport, N.A. Salmanova, M.I. Tretvakova
Seattle, Univ. of Washington	T.H. Burnett, J.G. Grote, T. Koss, J. Lord, D. Skelding, S. Strausz, R.J. Wilkes
Tashkent, Institute of Nuclear Physics	E.S. Basova, H. Nasrulaeva, S.Z. Nasyrov, N.V. Petrov, D.A. Qarshiev, T.P. Trofimova, U.I. Tuleeva
Tashkent, Physical-Technical Institute	L.P. Chernova, K.G. Gulamov, F.G. Kaydrov, N.S. Lukicheva, V.S. Navotney, N. Saidkhanov, L.N. Svechnikova, S.I. Zhochova
Wuhan, Hua-Zhong Normal University	X. Cai, H. Huang, L.S. Liu, W.Y. Quian, Z.Q. Wang, D.C. Zhou,
Yerevan, Physics Institute	F.A. Avetyan, N.A. Marutyan, L.G. Sarkisova, V.R. Sarkisyan
Spokesmen:	R.J. Wilkes (U.S.) and I. Otterlund (Overall)

Detector Layout. Plan and elevation views are shown for the detectors. For clarity, sections at the neutral line are shown for the magnets, collimators and vacuum chamber. M1 and M2 are the dipole spectrometer magnets; H1, H2, H3 are scintillation counter hodoscopes; S1, S2, S3 are straw tube arrays.

***Experiment 864 - Production of Rare Composite Objects in
 Relativistic Heavy Ion Collisions***

Brookhaven National Laboratory C.B. Dover, T.G. Throwe

Iowa State University L. Ewell, J.C. Hill, B. Libby, F.K. Wohn

**Massachusetts Institute
 of Technology** E.S. Hafen, P. Haridas, I. Pless

Penn State University T. Armstrong, R.A. Lewis, G.A. Smith

Purdue University R.M. Davies, A.S. Hirsch, H.Z. Huang, N.T. Porile,
 R.P. Scharenberg, B.K. Srivastava, B.C. Stringfellow,
 M.L. Tincknell

University of Bari, Italy P. Spinelli

University of Massachusetts M.S.Z. Rabin

Wayne State University R. Bellwied, B. Bennett, T. Cormier, J. Hall, C. Pruneau

Yale University K. Barish, M. Bennett, G.E. Diebold, J. Germani, J. Lajoie,
 R.D. Majka, J. Nagle, J.K. Pope, F.S. Rotondo,
 J. Sandweiss, B. Shiva Kumar, A.J. Slaughter, E.J. Wolin

Spokesman: **J. Sandweiss**

The experimenters propose to carry out a systematic set of measurements and searches for "composite" objects produced in high energy heavy ion collisions. These measurements are aimed at studies utilizing the heaviest ions available at the AGS, presumably, up to and including gold ions. Part of the study will involve lighter beams and these could be done at an earlier time, with perhaps an initial detector complement. A major focus of the experiment is on charged composites; however, studies of neutral systems are also considered significant in the study. The experiment is designed to study particles produced in the central region of rapidity which are produced in central collisions. Since composite systems must be produced by the overlap of particles produced in the collision, it is expected that composites will be made mostly in the central rapidity region where overlaps would be most probable.

<p align="center"><i>Experiment 865 - Proposal to Perform an Improved Search for the Decay $K^+ \rightarrow \pi^+ \mu^+ e^-$</i></p>

**Brookhaven
 National Laboratory**

D. Lazarus, L. Leipuner, H. Ma, P. Pile, P. Rehak, H. Takai

University of Connecticut J. Lozano

**Institute for Nuclear
 Research, Academy of Sciences of Russia (Moscow)**

G.S. Atoyan, S.N. Gninenko, V.V. Isakov, A.A. Poblaguev

**Joint Institute for
 Nuclear Research, Dubna**

B.Z. Zalikhanov

University of New Mexico B. Bassalleck, J. Lowe, D. Wolfe

Paul Scherrer Institute J. Egger, W.D. Herold, H. Kaspar, J. Missimer

University of Basel G. Backenstoss, H. Weyer

University of Pittsburgh D. Brown, D.E. Krauss, J.A. Thompson

**High Energy Physics
 Institute, Tbilisi State University**

N. Amaglobeli, Y. Bagaturia, D. Mazavia, T. Sachelashvili

Yale University

C. Alliegro, R. Appel, D. Bergman, A. Deshpande, M.E. Zeller

University of Zurich

P. Truoel

Spokesman:

M. E. Zeller

The experimenters propose to perform a new search for the decay $K^+ \rightarrow \pi^+ \mu^+ e^-$ with a sensitivity of $\sim 3 \times 10^{-12}$ (90% C.L.). The method employed is the same as that of the previous experiment, E777. That experiment achieved a sensitivity of 2.1×10^{-10} . The improvement of a factor of approximately 70 comes from the following factors: improved K^+ beam x7; larger acceptance apparatus x3; longer data acquisition period x2.3; improved hardware and software efficiency x1.5. In addition to the search for $K^+ \rightarrow \pi^+ \mu^+ e^-$, the experimenters will: collect 50,000 events from the decay $K^+ \rightarrow \pi^+ e^+ e^-$; will have the potential to measure the CP violating component of the polarization of the μ^+ in the decay $K^+ \rightarrow \pi^+ \mu^+ \mu^+$ with a precision of $\sim 10\%$ and will have the potential to measure the CP violating asymmetries in the decays $K^\pm \rightarrow \pi^+ \pi^- \pi^\pm$ with a statistical precision of 10^{-5} . The experiment is scheduled for a commissioning run in 1993 followed by data taking in 1994 until completed.

In keeping with the original purpose of E802 and E859, this experiment will continue the investigation of semi-inclusive single particle spectra using the gold beam (1) to measure the particle momentum spectra as a function of p_t and y ; (2) to find how these cross sections vary with "central" or "peripheral" collisions as taken from the event characterizing detectors; (3) to measure two-particle correlations; (4) to look for systemic variations in the cross sections with different beams and targets so as to clarify the reaction dynamics; and (5) to seek evidence in this measurement for the production of very dense nuclear matter, or ultimately, the quark-gluon plasma.

Beam: B1
 Status: In progress/construction
 Hours Charged/Approved Hours: 119/2600

<p align="center"><i>Experiment 866 - Studies of Particle Production at High Baryon Density Using the Au Beam</i></p>
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Argonne National Laboratory	S. Kaufman
Brookhaven National Laboratory	K. Ashktorab, D. Beavis, C. Chasman, Z. Chen, Y.Y. Chu, J.B. Cumming, R. Debbe, M. Gonin, S. Gushue, S. Hayashi, J. LeVine, B. Moskowitz, J. Olness, L.P. Remsberg, D. Roehrich, M.J. Tannenbaum, J.H. van Dijk, F. Videbaek, H. Wegner, F. Zhu
Columbia University	C.Y. Chi, B.A. Cole, S. Nagamiya, T. Nayak, O. Vossnack, F. Wang, Y. Wang, Y. Wu, W.A. Zajc
Institute for Nuclear Study, University of Tokyo	Y. Akiba, H. Hamagaki, S. Homma, H. Sako
Kyoto University	H. Kaneko
Kyushu University	Y. Tanaka
Lawrence Livermore Laboratory	H.C. Britt, J.B. Costales, M.N. Namboordiri, T. Sangster, J.H. Thomas, S. Tonse
Massachusetts Institute of Technology	L. Ahle, V. Cianciolo, W. Kehoe, D. Morrison, C. Ogilvie, S. Park, P. Rothschild, R. Soltz, S.G. Steadman, G.S.F. Stephans, T. Sung, D. Zachary
New York University	B. Budick
University of California Space Sciences Laboratory	H.J. Crawford, J. Engelage
University of California at Riverside	P. Beery, J. Chang, S.-Y. Fung, J. Kang, R. Seto, Q. Xu, Q. Zhu
University of Tokyo	R.S. Hayano, ... Sakurai, K. Shigaki, H. Tamura
University of Tsukuba	A. Kumagi, K. Kurita, Y. Miake, S. Ueno, K. Yagi
Spokesmen:	C. Chasman and H. Hamagaki

Schematic diagram of emulsion stack exposures.

Schematic diagram of the emulsion chamber exposures.

Beam: A3
Status: Completed in 1992
Hours Charged/Approved: 27/22

***Experiment 868 - Exp. 808-Interactions of 14.1 GeV/nucleon
nuclei from ^{16}O to ^{197}Au in light and heavy targets***

University of Minnesota	C.J. Waddington
Louisiana State University	M.L. Cherry, P. Dienes-Jones, W.V. Jones, K. Sengupta, J.P. Wefel
Institute of Nuclear Physics, Krakow	A. Dambrowska, R. Holynski, A. Jurak, A. Olszewski, M. Szarska, A. Trzupek, B. Wilczynska, H. Wilczynski, W. Wolter, B. Wosiek, K. Wozniak
Institute of Theory and Experimental Physics Moscow	A.I. Dubinina, O.K. Egorov, E.D. Kolganova, E.A. Pozharova, T.Yu. Skorotko, V.A. Smirnitski
Spokesman:	C.J. Waddington

The Krakow-Louisiana-Minnesota (KLM) collaboration has previously exposed small stacks of nuclear emulsions to the light nuclei beams available from the AGS, Exp. 808. The results of this work, when combined with similar exposures of stacks and chambers made at CERN to higher energy beams, EMU07, have been reported in a number of published papers. In April 1992, when beams of heavier nuclei became available with the commissioning of the Booster, the KLM-Moscow collaboration (KLMM) exposed stacks and chambers of nuclear emulsions to a beam of gold nuclei with a nominal energy of 11.4 GeV/nucleon. Excellent exposures were obtained and the emulsions successfully processed at Dubna. Analysis of the interactions in these emulsions is proceeding on schedule and preliminary results based on the detection of more than 1,000 interactions in a minimum bias scan will be reported in 1993.

1992 BNL layout Exp 869

Schematic diagram of the detector setup used for the April 1992 AGS gold run. Ion chambers I - 0 to 4 are four gap parallel plate chambers filled with P10 gas. Cherenkov counters C - 0 to 3 contain radiators of Pilot 425 plastic mounted in white diffusion boxes. The multiwire proportional counters MW have 1 mm wire spacing. The target holder can place any of the targets in the beam by remote command. Thirty-two channels of data are recorded for each event at rates of up to 1,000 events/sec.

***Experiment 869 - Measurement of Fragment Yields for 14 GeV/nucleon
Au + X Collisions***

University of Minnesota	B.S. Nilsen, C.J. Waddington
Washington University	W.R. Binns, L.Y. Geer, J. Klarmann
Caltech	J.R. Cummings, T.L. Garrard, E.C. Stone
Spokesman:	C.J. Waddington

This experiment was proposed in order to continue a determination of the fragmentation of ultra heavy, UH, nuclei begun at the Bevalac as part of a program of cosmic ray studies. It required additional experiments using the new Booster facility at the Brookhaven AGS. The experiments at the AGS would extend the energy range of the measurements upwards to match the energies of the majority of observed cosmic ray nuclei. These measurements would improve our ability to predict the partial cross sections for the production of fragments and allow better calculations of the abundances of the cosmic ray UH nuclei at the sources by taking account of the effects of propagation on the observed abundances. These measurements would also extend current studies of the nuclear physics topics of factorization, limiting fragmentation, charge pickup, Coulomb dissociation and fission.

The detector array used during an exposure to the AGS gold beam in April 1992 is shown. It consists of a combination of ion chambers and Cherenkov counters which identify the particles entering a target and then measure the sum of the charges emitted from interactions in the targets. During the April exposure gold projectiles were allowed to fall on targets of polyethylene, carbon, aluminum, copper, tin and lead. In each case sufficient data was taken to determine partial cross sections of 10 mb with better than 10% accuracy. In addition, a fragmentor was placed in the primary beam, generating secondary beams of fragments. Sufficient of these fragments were generated to allow partial cross sections to be determined in the targets for all projectiles between $Z = 79$ and 70 . The excellent resolution of the detector array allows the identification of fragments with charges as low as $A = 50$ coming from gold projectiles. Preliminary results on the total and partial cross sections of the gold projectiles will be reported in 1993.

Experiment 871 - A New Search for Very Rare K_L Decays

University of California at Irvine	R. Atmur, D. Connor, J. Hsu, N. Kanematsu, W.R. Molzon
Stanford University	K. Ecklund, C. Hartman, G.M. Irwin, N. Mar, D.A. Ouimette, M. Pommot-Maia, S.G. Wojcicki
University of Texas at Austin	C.C. Allen, D. Ambrose, S. Graessle, S. Hamilton, G.W. Hoffmann, K. Lang, M.R. Marcin, J. McDonough, C.T. Nguyen, P.J. Riley, J.L. Ritchie, C.B. Ware, S. Worm
College of William and Mary	M. Eckhause, A.D. Hancock, C. Hoff, J.R. Kane, Y. Kuang, R.D. Martin, P. Rubin, R.E. Welsh, M. Witkowski
Spokesmen:	J. R. Kane, W.R. Molzon, J.L. Ritchie, S.G. Wojcicki

This group plans to carry out a new search for the decays $K_L \rightarrow \mu e$ and $K_L \rightarrow ee$, building on the experience from the recently completed experiment, E791. The $K_L \rightarrow \mu\mu$ branching ratio measurement will also be improved. The final E791 single event sensitivity for $K_L \rightarrow \mu e$ was about $1-2 \times 10^{-11}$. The new experiment will reach a single event sensitivity below 10^{-12} , and if no events are observed, will set an upper limit of about 2×10^{-12} . About 10,000 $K_L \rightarrow \mu\mu$ decays will also be observed.

The experiment will take the novel approach of stopping the neutral beam in a beam stop near the upstream end of the spectrometer.

Schematic of secondary beamline C6

The beamline can be sectioned into four parts: (1) momentum/charge selection (C6Q1 to C6Q2), (2) mass selection (C6BS1 to C6BS2), (3) target incident momentum analysis (C6Q5 to C6Q8), and (4) target scattered momentum analysis (C6Q9 to C6Q12). The z direction is defined along the beam axis.

Beam: C6
Status: In progress
Hours Charged/Approved: 383/783

***Experiment 874 - Kaon-Nucleus Quasielastic and Elastic Scattering
at 720 MeV/c***

University of Colorado	C. Kormanyos, R.J. Peterson, J. Wise
University of Houston	E. Hungerford, B.W. Mayes, L. Pinsky
Brookhaven National Laboratory	S. Bart, R. Chrien, R. Sawafta, R.J. Sutter
Spokesmen:	R.E. Chrien, E. Hungerford, R.J. Peterson

Incoherent quasielastic scattering of positive kaons should show their putatively long free path through a simple proportionality of nuclear cross sections to the number of target nucleons in isosymmetric ($T=0$) targets. In this case, one can search for evidence of alternations to the free characteristics of nucleons when placed in the interior of a nucleus by precision comparison of quasielastic scattering on several $T=0$ targets with varying volume to surface ratios. Elastic K^+ scattering on some of these targets at the same beam momentum allows a similar but independent test of altered nucleons by way of optical model methods.

Therefore, the experimenters propose to investigate K^+ elastic and quasifree scattering from nuclear systems to provide more accurate data to compare to theory, and to investigate possible momentum dependence in the scaling parameters to better reconcile the theory with the recent total cross section measurements.

Beam: A3/B1
Status: In progress
Hours Charged/Approved: 27/2

***Experiment 875 - Study of Particle Production and Nuclear Fragmentation
in Relativistic Heavy-Ion Collisions in Nuclear Emulsions***

**State University of
New York at Buffalo**

A.Z.M. Ismail, P.L. Jain, A. Mukhopadhyay, G. Singh

Spokesman:

P.L. Jain

Nuclear emulsions will be used to study the nuclear collisions of ^{197}Au , ^{32}S and any other heavy-ion beams when they are available. On an event-by-event basis, shower particle multiplicity, pseudorapidity density and density fluctuations of charged particles, charge multiplicity and angular distribution of projectile fragments, production and interaction cross section of heavily ionizing particles emitted from the target fragmentation, will be measured in nuclear emulsion. Special emphasis will be placed on the analysis of events produced in the central collisions which are selected on the basis of low energy fragments emitted from the target excitation.

876

Beam: D2
Status: Construction
Approved Hours: 300

<i>Experiment 876 - μ^+ Surface Beam Characterization</i>
--

College of William and Mary	A. Greer, W.J. Kossler, H.E. Schone
Virginia State University	M.R. Davis, C.E. Stronach
George Mason University	W.F. Lankford
Columbia University	G. Luke, B. Sternlieb, Y.J. Uemuera
Spokesman:	W.J. Kossler

This experiment proposes to characterize the μ^+ beam produced from π decay on the surface of the D-line production target. Comparisons to similar beams at TRIUMF indicate that a flux in excess of $10^5/\text{cm}^2$ per pulse for 10^{13} protons per pulse might be expected. Such an intensity would make μSR at Brookhaven National Laboratory competitive with TRIUMF and PSI for the majority of this type of research.

E877

Beam: C5
Status: In progress/construction
Hours Charged/Approved: 144/1100

Experiment 877 - Study of Relativistic Nuclear Collisions with Heavy Beams Using the E814 4π Calorimetry and Modified Forward Spectrometer

Brookhaven National Laboratory	T. Ludlam, S. McCorkle, E. O'Brien, C. Woody
GSI, Darmstadt	N. Herrmann
Idaho National Engineering Laboratory	J. Cole, M. Drigert
McGill University	J. Barrette, S. Gilbert, R. Lacasse, S.K. Mark, L. Normand, M. Rosati, N. Starinsky, G. Wang
University of Pittsburgh	W. Cleland, U. Sonnadara, S. Voloshin
University of Sao Paulo	N. DaSilva, O. Dietzsch, M. Takagui
SUNY at Stony Brook	P. Braun-Munzinger, J. Dee, T.K. Hemmick, B. Hong, Y. Kwon, M. Rao, S. Sedykh, J. Stachel, J. Wessels, N. Xu, Y. Zhang, C. Zou
Wayne State University	R. Bellwied, S. Bennett, T. Budny, T. Cormier, A. French, F. Gang, J. Hall, B. Kim, K. Lahab, Q. Li, A. Lukaszew, R. Matheus, C. Pruneau, J. Sheen, H. Xiong
Spokesman:	P. Braun-Munzinger

Using an upgraded E814 set-up, this experiment proposes to study central collisions between heavy nuclei and projectiles from the Booster/AGS accelerators. The main emphasis is on a detailed study of the energy flow into 4π and measurements of the spectra of nucleons and produced particles for rapidities $y > 1.5$ and low transverse momenta, with event characterization over the full solid angle. In addition, nucleons, nuclear fragments and produced particles in the target fragmentation region will be measured.

E878 Spectrometer A3 line

IC1,2 :	Ionization chambers
Et	multiplicity detector
TOF1,2,3,4:	Multistat scintillator detectors for time of flight
DC1,2,3,4:	6 plane S, T, U drift chambers
CK1,2:	gas Cherenkov detectors
CK3,4:	Silica aerogel Cherenkov detectors

Beam: A3
 Status: In progress
 Hours Charged/Approved: 407/807

***Experiment 878 - Investigation of Antinucleus Production
 and Search for New Particles in Nucleus-Nucleus Collisions at the AGS***

University of California Space Science Laboratory	H.J. Crawford, J. Engelage, L. Greiner
Brookhaven National Laboratory	D. Beavis, R. Debbe
University of California Los Angeles	J. Carroll, T.J. Hallman, G. Igo
KEK	J. Chiba, K.H. Tanaka
University of Waseda	T. Doke, T. Kashiwagi, J.H. Kikuchi
Johns Hopkins University	R. Welsh
University of Tokyo	R.S. Hayano
Lawrence Berkeley Laboratory	I. Flores, H. Heckman, P.J. Lindstrom, R. Wright
Columbia University	S. Nagamiya, P. Stankus
University Space Research Association	J. Mitchell
Yale University	M. Bennett, K. Pope, B. Shiva Kumar
Spokesman:	H.J. Crawford

The purpose of the experiment is to investigate antideuteron ($\bar{d}$) production in Au-Au collisions at the AGS using the A3 line as a spectrometer. This is a follow-on to our E858 program, an investigation of $\bar{d}$ production in Si+Al, Si+Cu, and Si+Au interactions, which achieved high statistics measurements of the π^- , K^- , $\bar{p}$ spectra at 0° and set new limits on the production of stable negative particles. It was shown that the $\bar{p}$ yield per interaction was smaller than expected and the $\bar{d}$ yield was well below the level calculated from a simple coalescence model. The goal of E878 is to further investigate the hadronization process with a systematic study of pA, SiA, and AuA collisions, to determine $\bar{d}$ production from these systems, and to provide high statistics measurements of the π , K, p spectra at 0° over a broad range of secondary momenta, 1.5 - 20 GV.

POLARIZED PROTON COLLISIONS AT BROOKHAVEN

***Experiment 880 - The Effects of a Partial Siberian Snake on Polarization
at the AGS***

**Indiana University
IUCF**

D. Caussyn, T. Ellison, H. Huang, B. Jones, S.Y. Lee,
P. Schwandt, Y. Wang

**Brookhaven National
Laboratory**

L. Ahrens, J. Alessi, E.J. Bleser, G. Bunce, P. Cameron,
E.D. Courant, H.W.J. Foelsche, C.J. Gardner, J. Geller, Y.Y. Lee,
Y.I. Makdisi, S.R. Mane, S. Peggs, L. Ratner, K. Reece, T. Roser,
J.F. Skelly, A. Soukas, S. Tepikian, R.E. Thern, D. Trbojevic,
W. van Asselt

**Argonne National
Laboratory**

H. Spinka, L. Teng, D.G. Underwood, A. Yokosawa

TRIUMF

U. Wienands*

Fermilab

V. Bharadwaj, Shao Hseuh

KEK

S. Hiramatsu, Y. Mori, H. Sato, T. Toyama, K. Yokoya

Spokesmen:

S.Y. Lee and L. Ratner

This group will build a 4.7 Tesla-meter room temperature solenoid which will be installed in a 10-foot long AGS straight section. AGS polarized proton beam time will be used to perform *partial snake experiments*. These experiments will test the idea of using a partial snake to correct all depolarizing imperfection resonances and also test the feasibility of betatron tune jump in correcting intrinsic resonances in the presence of a partial snake.

* Present address: SSC Laboratory, 2550 Beckleymeade Avenue, Dallas TX 75237-3946.

A Schematic of the MPS II Experimental Arrangement for $\phi\phi$ Experiments.

Beam: B2
Status: In progress
Hours Charged/Approved: 821/1500

***Experiment 881 - Utilizing $\phi\phi$ Spectroscopy to Search for Exotic Glueballs,
Exotic Hybrid or Exotic Multiquark States***

**Brookhaven Nat. Lab. and
City College of New York**

S.J. Lindenbaum

**Brookhaven National
Laboratory**

R.W. Hackenburg, R.S. Longacre

City College of New York

C.S. Chan, M.A. Kramer, K. Zhao, Y. Zhu

**Rensselaer Polytechnic
Institute**

G. Adams, K. Vaziri

Spokesman:

S.J. Lindenbaum

The powerful $\phi\phi$ spectroscopy which resulted in the discovery of $I^{GJPC} = 0^{+2^{++}}g_T(2010)$, $g_T'(2300)$ and $g_T''(2340)$ (which are prime glueball candidates) will be used to search for exotic glueballs, exotic hybrids and exotic multiquark states.

A first run occurred in the summer of 1992. Analysis of the early data obtained is in progress.

Layout of first experiment, showing end of beam pipe, Pb target, and slowing stacks of CR-39 plastic detectors alternating with Pb, at a distance of 1 m downstream from the target. Shaded stacks consist of 12 repeat units of CR-39/Pb; unshaded stacks consists of 3 repeat units.

Layout of second experiment, showing end of beam pipe, Pb target, high-field region of bending magnet, and three tracking chambers consisting of 25 thin CR-39 sheets at 2 cm intervals.

Beam: A3
Status: In progress
Hours Charged/Approved: 21/50

***Experiment 882 - Search for Particles with $|Z| \geq 3$ and Negative Charge
or Large A/Z Produced in Central Nucleus-Nucleus Collisions***

University of California Y. He, D.M. Lowder, P.B. Price
at Berkeley

Spokesman: P.B. Price

Two experiments are proposed which will use CR-39 track detectors to study production of multiply charged composites in central collisions, and in particular search for both positively and negatively charged mid-rapidity particles with $|Z| \geq 3$, especially those with anomalously large A/Z.

2 of 2

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Experiment 883 - Fragmentation of Au-Projectiles at AGS Energies

University of Siegen

J. Dreute, W. Heinrich, G. Rusch, B. Wiegel, E. Winkel

Spokesman:

W. Heinrich

Stacks of plastic nuclear track detectors and different target materials will be exposed to beams of Au projectiles. The detectors will record tracks of relativistic nuclei with charge numbers $Z \geq 6$. After development of the tracks by etching, they will be detected and measured using completely automated microscope systems. Experiments with high statistics are therefore possible. Multifragmentation events in which several intermediate mass fragments are emitted from the heavy projectile will be studied in detail. Charge, emission angles and transverse momenta of the fragments will be determined. Similar experiments using Kr, Ag, Au and U beams at the BEVALAC have been performed. By a comparison of the fragmentation systematics of Au at AGS and BEVALAC energies, it is hoped to obtain significant indications whether the process of multifragmentation is related to a phase transition of nuclear matter or whether it is a statistical breakup only that does not depend on beam energy.

The good charge resolution of our detectors, especially for fragments with small charges, will allow the experimenters to search for projectile fragments with fractional charge.

TARGET FOR FRACTIONAL CHARGE ENHANCEMENT WITH 24 GeV PROTON BEAM

Beam: A
Status: Completed 1992
Hours Charged/Approved: 13/7

Experiment 884 - An Experiment to Enhance Fractional Charge Impurities (FCI) in Semiconductors to be Used in an Optoelectronic Search for FCIs

University of Pittsburgh S. Betarbet, W.E. Cleland, S. Matsik, A.G.U. Perera

Spokesman: **A.G.U. Perera**

This experiment proposes to extend the search for fractional charge impurities (FCIs) in silicon to include a search for FCIs produced by a 28 GeV/c proton beam. A previous search was conducted for naturally occurring FCIs in silicon, yielding an upper limit of 4 FCIs per 10^{20} atoms, lower than any other existing upper limit for naturally occurring fractionally charged particles. A setup consisting of an Al target and a stack of 20 diodes are exposed to the primary proton beam. Using existing upper limits for free quark production by high energy beams, the number of quarks that are expected to be stopped in the sensitive region of the detector are estimated. The experimenters should be able to set a comparable upper limit (within a factor of 3) to the current value.

Fig. 1. Detector configuration for AA experiment. Drift chambers ID1, ID2, and ID3 determine incoming K^- trajectory and are combined with upstream hodoscope data to determine K^- momentum. Drift Chambers FD1, FD2, FD3, BD1 and BD2 determine K^+ momentum. Scintillators IT and BT determine K^+ time-of-flight. Hodoscopes FP and BP determine spectrometer acceptance. Aerogel Cerenkovs IC1, IC2, FC, and BC reject pions. Hydrogen Cerenkov FCH rejects protons.

Experiment 885 - Experiment to Detect $\Lambda\Lambda$ Hypernuclei

Brookhaven National Laboratory	S. Bart, R. E. Chrien, M. May, P. H. Pile, R. Sawafta, R. Sutter
Carnegie-Mellon University	G. Franklin, R. Magahiz, F. Merrill, B. Quinn, R. Schumacher, V. Zeps
Kyoto University	T. Iijima
University of Kyoto Sangyo	F. Takeutchi
University of Manitoba	C. Davis, S. Page, D. Ramsay, W. van Oers
University of New Mexico	B. Bassalleck, J. Lowe, A. Rusek, D. Wolfe
TRIUMF	D. Gill
Vassar College	R. Stearns
Spokesmen:	M. May and G. Franklin

The 2 GeV kaon beam and the spectrometer of Exp. 813 will be used to observe and study the properties of $\Lambda\Lambda$ hypernuclei.

The question of what form matter takes when some strange quarks are present has been the subject of speculation. In the conventional picture, hypernuclei, where the strange quarks appear in lambda particles are the ground state of strange matter. There are suggestions that multi-quark states, rather than lambda particles, are the lowest energy state for matter containing roughly equal numbers of up downs and strange quarks. The H particle is proposed as a six quark state (uuddss) below the mass of two lambda particles. If this is the case, two lambdas in a hyper-nucleus will fuse to form an H particle, as no selection rule forbids it.

Hypernuclei containing one lambda have been intensively studied; there are only 3 candidates (one recent) for $\Lambda\Lambda$ hypernuclei. New data on double hypernuclei will be a cornerstone for understanding proposals for more exotic forms of strange matter.

* Full particle tracking through front and back spectrometers
 --> p/Z determined twice

Experiment 886 - Search for New Particles in Nucleus-Nucleus Collisions

Kyoto University	H. Enyo, T. Iijima, K. Imai, A. Masaike
Kyoto Sangyo University	K. Okada, F. Takeuchi
University of Birmingham	N. Nelson, R. Zybert
Brookhaven National Laboratory	D. Beavis, R. Chrien, P. Pile, R. Sawafta, R. Sutter
Carnegie Mellon University	G. Franklin, R. Magahiz, F. Merrill, B. Quinn, R. Schumacher, R. Sukaton, V. Zeps
Yale University	G. Diebold
University of New Mexico	B. Bassalleck, J. Hall, J. Lowe,* A. Rusek, D.M. Wolfe
Freiburg University	M. Burger, J. Franz, E. Rössle, H. Schmitt
Spokesmen:	K. Imai, P. Pile, and G. Diebold

The purpose of this experiment is to search for new particles, such as strange quark matter (strangelets), in nucleus-nucleus collisions. It has been suggested that strangelets might exist and may be produced in relativistic nucleus-nucleus collisions. Using the 2 GeV/c K-beam line as a mass spectrometer, the experimenters propose to search for long-lived ($\tau > 10^{-8}$ s) particles with large mass to charge ratios ($M/Z > 3$ GeV/c²) as is expected for strangelets.

E886 was approved in late February 1992 for a nominal 100 hour test run during the 1992 heavy ion running period. This marked the first time heavy ions were delivered to the D line. During this test run E886 ran smoothly and efficiently, completing its test runs using available beam not required by other users. A total of 283 beam hours were charged; however, the beam intensity during most of this running was low. Of the 283 hours charged, approximately 20 hours of Au beam and 50 hours of Si beams were at the highest available intensities ($\approx 10^7$ Au and 10^9 Si ions per spill). As a result of the excellent particle identification and high rate capabilities of the D6 beam line and spectrometer system, the production cross sections of a broad range of known particles were quickly measured. This included $\pi^\pm$, $K^\pm$, $p^\pm$, d, t, ^3He , and ^4He . In the high sensitivity runs associated with the Si strangelet searches, rare nuclear species such as ^6He and ^8He were also measured. For Au running, sensitivity was limited due to the relatively low ($10^7/\text{spill}$) beam intensity. The strangelet search will continue in FY 93 with, hopefully, a more intense gold beam. The strangelet sensitivity is expected to be sufficient to seriously constrain strangelet production models based on intermediate quark-gluon plasma formation.

* Also at the University of Birmingham.

a)

END VIEW

Experiment 887 - Do Narrow Σ Hypernuclear States Exist?

Brookhaven National Laboratory	S. Bart, R.E. Chrien, R. Sawafta, R. Sutter
CEBAF	K. Baker, L. Tang
University of Houston	M. Barakat, E.V. Hungerford
University of Indiana (tentative)	S.M. Bowyer, S. Wells, S.W. Wissink
INS	H. Ota
Ohio State University	K. Hicks, B. Larson, R. Michael
University of Tokyo	R.S. Hayano, Y. Shimizu, H. Tamura
Spokesmen:	R. Sawafta, K. Hicks

It is proposed to measure hypernuclear mass spectra for in-flight ($K^-, \pi^\pm$) reactions at $p_K = 600$ MeV/c from ${}^7\text{Li}$, ${}^9\text{Be}$, ${}^{12}\text{C}$ and ${}^{16}\text{O}$ targets at the LESBII beam line. The main thrust of this proposal is to provide data with sufficient energy resolution and statistics, in order to investigate systematically whether narrow Σ hypernuclear states exist below or above threshold in light hypernuclei.

If the reported long-lived Σ states are confirmed, the experiment should be able to provide better determinations of their parameters. Subsequently this will help in resolving the ambiguities that exist between the different experiments and put more constraints on the long-standing theoretical questions related to this subject.

Experiment 888 - Search for the H Dibaryon

Brookhaven National Laboratory M. May, S. White

University of California-Irvine D. Connor, J. Cortese, W.R. Molzon

**University of California-
Los Angeles** R.D. Cousins

Princeton University V.L. Fitch, J. Klein, A.J. Schwartz

Stanford University M.V. Diwan, K. Ecklund, G.M. Irwin, D.A. Ouimette,
S.G. Wojcicki

Temple University J. Belz, V.L. Highland, S.H. Kettell

**University of Texas
at Austin** C.A. Allen, G.W. Hoffmann, K. Lang, M.R. Marcin,
J. McDonough, C.T. Nguyen, P.J. Riley, J.L. Ritchie,
B. Ware, S. Worm

College of William and Mary M. Eckhause, A.D. Hancock, J.R. Kane, Y. Kuang,
W.F. Vulcan, R.E. Welsh, R.G. Winter, M. Witkowski

Spokesmen: R.D. Cousins and A.J. Schwartz

The experimenters propose to search for the H dibaryon (six-quark $uuddss$ state) using the E791 beam line and spectrometer, modified for two H detection techniques. In both cases they will attempt to produce the H 's in the proton-nucleus interactions. In the first technique, they will search for the decay sequence $H \rightarrow \Lambda X \rightarrow p\pi^- X$ in the decay volume. In the second, they will look for diffractive dissociation of long-lived H 's: $H + A \rightarrow \Lambda\Lambda A \rightarrow p\pi^- p\pi^- A$. Combined, the two methods cover a wide range of possible H lifetimes.

E888 completed data-taking in 1992 and is now analyzing data.

890

Scale: 1" = 71.6"

***Experiment 890 - A New Test of Charged Symmetry
 in Eta Production on Deuterium***

**University of California
 Los Angeles**

M. Clajus, B.M.K. Nefkens, J.W. Price, W.B. Tippens,
 M.J. Wang, D.B. White

Brookhaven National Laboratory S. Bart, R.E. Chrien, P.H. Pile, R. Sawafra, R.J. Sutt

Los Alamos National Laboratory D.M. Jansen, M.J. Leitch, J.C. Peng

Forschungszentrum Jülich H. Seyfarth

Ruder Boskovic Institute M. Batinić, I. Šlaus, A. Švarc

Spokesmen: B.M.K. Nefkens, R.E. Chrien, J.C. Peng

The experimenters propose to measure R_1 from threshold at $p_\pi = 607$ MeV/c to the maximum C-8 beam momentum of 750 MeV/c which is beyond the peak of the $S_{11}(1535)$ resonance. They plan to measure the ratio R_2 at incident pion energies that span the opening of the η channel, $p_\pi = 570$ -750 MeV/c. The measurement of R_1 is a direct test of the validity of charge symmetry in the unexplored domain of η -nuclear physics. Violations of charge symmetry are expected as a consequence of the difference in the $n\eta$ and $p\eta$ interactions, and π^0 - η mixing.

A secondary objective of this proposal is to explore the dependence on energy and angle of the $\pi^+d \rightarrow pp\eta$ differential cross section. The $\pi^+d \rightarrow pp\eta$ reaction is being considered as the η production reaction of a new AGS η factory. New tests of C, CP, T and CPT invariance can be done using various rare decays of the η .

The experiment intends to determine the ratios R_1 and R_2 by measuring the relative η and π^0 yields due to π^+ and π^- interactions in deuterium. The η or the π^0 is detected via its $\gamma\gamma$ decay mode using a neutral meson spectrometer.

$$R_1 \equiv d^2\sigma(\pi^-d \rightarrow nn\eta)/d^2\sigma(\pi^+d \rightarrow pp\eta)$$

$$R_2 \equiv d^2\sigma(\pi^-d \rightarrow nn\pi^0)/d^2\sigma(\pi^+d \rightarrow pp\pi^0)$$

Publications of AGS Experiments begin here.

Publications - AGS Experiments 1982 - 1993

This listing was originally prepared using the SLAC data base SPIRES; we now rely on the experimenters themselves to supply us with information. It is easy to miss publications in such a wide search and we apologize for any left out or misidentified. Please let us know about these as well as keeping us posted on your recent publications of AGS experiments.

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List of AGS Experimenters begins here.

Listing of Experimenters

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Adams, D.L.	Rice University (810, 817)
Adler, S.	Brookhaven National Laboratory (787)
Aggarwal, M.M.	Chandigarh, Panjab University (863)
Ahle, L.	Massachusetts Institute of Technology (866)
Ahmad, S.	Rice University (810, 817, 854)
Ahn, H.	Yale University (821)
Ahrens, L.	Brookhaven National Laboratory (880)
Akerib, D.S.	Princeton University (787)
Akiba, Y.	Institute for Nuclear Study, University of Tokyo (859, 866)
Alessi, J.	Brookhaven National Laboratory (880)
Alexandrov, Y.A.	Moscow, Lebedev Institute (863)
Allen, C.	University of Texas-Austin (871, 888)
Alliegro, C.	Yale University (865)
Alster, J.	Tel-Aviv University (835, 850)
Amaglobeli, N.	High Energy Physics Institute, Tbilisi State University (865)
Andreeva, N.P.	Alma Ata, Institute of High Energy Physics (863)
Anson, Z.V.	Alma Ata, Institute of High Energy Physics (863)
Aoko, M.	University of Tokyo (858).
Appel, R.	Yale University (865)
Arcambeau, J.	Loma Linda University (856)
Ardebili, M.	Princeton University (787)
Arisaka, K.	University of Pennsylvania (791)
Armstrong, T.	Penn State University (864)
Arora, R.	Chandigarh, Panjab University (863)
Ashery, D.	Tel-Aviv University (835)
Athanas, M.	Carnegie-Mellon University (788, 813, 836)
Atiya, M.S.	Brookhaven National Laboratory (787)
Atmur, R.	University of California-Irvine (871)
Atoyan, G.S.	Institute for Nuclear Research, Academy of Sciences of Russia (Moscow) (865)
Auerbach, L.B.	Temple University (791)
Axelrod, S.	Stanford University (791)
Backenstoss, G.	University of Basel (865)
Badyal, S.K.	University of Jammu (863)
Bagaturia, Y.	High Energy Institute, Tbilisi State University (865)
Baker, K.	CEBAF (887)
Barakat, M.	University of Houston (887)

Barbosa, F.	University of Massachusetts-Dartmouth (850)
Barish, K.	Yale University (864)
Barkov, L.M.	Institute for Nuclear Physics, Novosibirsk (821)
Barna, S.	Princeton University (787)
Barnes, P.	Carnegie-Mellon University (781, 788, 813, 836)
Barnes, P.	LAMPF (886)
Barrette, J.	McGill University (814, 877)
Bart, S.	Brookhaven National Laboratory (774, 781, 788, 813, 835, 836, 856, 874, 885, 887, 890)
Barton, D.S.	Brookhaven National Laboratory (850)
Bar-Yam, N.	University of Massachusetts-Dartmouth (818, 852)
Bassalleck, B.	University of New Mexico (774, 788, 813, 836, 865, 877, 885, 886)
Bassano, D.	SUNY Health Science Center (856)
Batinić, M.	Ruder Boskovic Institute (890)
Baumbaugh, B.	University of Notre Dame (852)
Beatty, J.	Boston University (858)
Beavis, D.	Brookhaven National Laboratory (844, 858, 859, 866, 878, 886)
Beery, P.	University of California-Riverside (859, 866)
Bellwied, R.	State University of New York-Stony Brook (814, 877)
Bellwied, R.	Wayne State University (877)
Belz, J.	Temple University (791, 871, 888)
Bennett, G.	Brookhaven National Laboratory (821, 856)
Bennett, M.	Yale University (878)
Bennett, S.	Wayne State University (814, 877)
Berdoz, A.	University of Manitoba (813, 836)
Betarbet, S.	University of Pittsburgh (884)
Bhalla, K.B.	Jaipur, University of Rajasthan (863)
Bhasin, A.	University of Jammu (863)
Bhatia, T.S.	Texas A&M University (794)
Bhatia, V.S.	Chandigarh, Panjab University (863)
Biery, K.	Stanford University (791)
Birien, P.	Freiburg University (813, 836)
Birien, P.	CEN, Saclay (813, 836)
Binns, W.R.	Washington University (869)
Bishop, J.M.	University of Notre Dame (852)
Blackmore, E.W.	TRIUMF (787)
Bodyagin, V.	Moscow State University (852)
Bogdanov, V.G.	Leningrad, Khlopin Radium Institute (863)
Bonner, B.E.	Rice University (810, 817, 818, 854)
Bowyer, S.M.	University of Indiana (887)
Brabson, B.B.	Indiana University (852)
Bravina, L.	Moscow State University (852)
Braun-Munzinger, P.	State University of New York-Stony Brook (814, 877)
Brill, A.B.	University of Massachusetts (856)

Britt, H.C.	Lawrence Livermore Laboratory (859, 866)
Brown, D.H.	Boston University (821)
Brown, H.N.	Brookhaven National Laboratory (821)
Brown, K.A.	Brookhaven National Laboratory (794)
Bryman, D.A.	TRIUMF (787)
Bubnov, V.I.	Alma Ata, Institute of High Energy Physics (863)
Buchanan, J.A.	Rice University (810, 817, 854)
Buchholz, P.	Temple University (791)
Budick, B.	New York University (781, 859)
Budny, T.	Wayne State University (877)
Buerger, T.	Freiburg University (813)
Bunce, G.	Brookhaven National Laboratory (821, 850, 880)
Burger, M.	Freiburg University (886)
Burnett, T.	University of Washington (852, 863)
Cameron, P.R.	University of Michigan (794, 880)
Cameron, R.	University of Rochester (840)
Cantatore, G.	University of Rochester/Trieste (840)
Carey, R.M.	Boston University (821)
Cason, N.M.	University of Notre Dame (852)
Carroll, A.S.	Brookhaven National Laboratory (850)
Carroll, J.	University of California-Los Angeles (858, 878)
Caussyn, D.	Indiana University (880)
Chapman, M.	College of William and Mary (791)
Chan, C.S.	City College of New York/Brookhaven National Laboratory (810, 854, 881)
Chan, X.	Linfen, Shanxi Normal (863)
Chasman, C.	Brookhaven National Laboratory (859, 866)
Chasnicov, I.Y.	Alma Ata, Institute of High Energy Physics (863)
Chen, Z.	Brookhaven National Laboratory (859, 866)
Chernyavskil, M.M.	Moscow, Lebedev Institute (863)
Cherry, M.L.	Louisiana State University (866)
Chi, C.Y.	Columbia University (859)
Chiang, I-H.	Brookhaven National Laboratory (787)
Chiba, J.	National Laboratory for High Energy Physics (KEK) (858, 878)
Chiou, C.N.	Rice University (810)
Chrien, R.E.	Brookhaven National Laboratory (774, 781, 788, 813, 835, 836, 856, 874, 885, 886, 887, 890)
Chu, Y.Y.	Brookhaven National Laboratory (859, 866)
Chung, S.U.	Brookhaven National Laboratory (817, 818, 852)
Cianciolo, V.	Massachusetts Institute of Technology (859, 866)
Clajus, M.	University of California-Los Angeles (890)
Clark, R.	Vanderbilt University (855)

Cleland, W.	University of Pittsburgh (814, 877, 884)
Clement, J.M.	Rice University (810, 817, 854)
Cole, B.	Columbia University (859)
Cole, B.A.	Massachusetts Institute of Technology (866)
Cole, J.	Idaho National Engineering Laboratory (877)
Connor, D.	University of California-Irvine (871, 888)
Convery, M.	Princeton University (787)
Corcoran, M.D.	Rice University (810, 817)
Cormier, T.	Texas A&M University (877)
Cormier, T.	Wayne State University (814, 877)
Cortese, J.	University of California-Irvine (871)
Costales, J.B.	Lawrence Livermore Laboratory (859, 866)
Courant, E.D.	Brookhaven National Laboratory (880)
Courant, H.	University of Minnesota (850)
Court, G.R.	University of Michigan (794)
Cousins, R.D.	University of California-Los Angeles (791, 888)
Crabb, D.G.	University of Michigan (794)
Crawford, H.J.	University of California Space Sciences Lab. (858, 859, 866, 878)
Crittenden, R.	Indiana University (818, 852)
Cullen, J.R.	Brookhaven National Laboratory (821)
Cumming, J.B.	Brookhaven National Laboratory (844, 862, 859, 866)
Cummings, J.R.	Caltech (869)
Cushman, P.	Yale University (821)
Danby, G.T.	Brookhaven National Laboratory (794, 821)
DaSilva, N.	University of São Paulo (814, 877)
David, G.	State University of New York-Stony Brook (814, 877)
Davis, C.L.	University of Louisville (852)
Davis, C.	University of Manitoba (813, 836, 885)
Davis, M.R.	Virginia State University (876)
Davison, N.	University of Manitoba (813, 836)
Debbe, R.	Brookhaven National Laboratory (858, 859, 866, 878)
Debevec, P.	University of Illinois (821)
Dee, J.	State University of New York-Stony Brook (814, 877)
Dejbakhsh, H.	Texas A&M University (877)
Demianov, A.	Moscow State University (852)
DeMuth, G.	University of Michigan (794)
Denniston, C.	Princeton University (787)
Deutsch, M.	Massachusetts Institute of Technology (781)
Dhawan, S.K.	Yale University (821)
Diebold, G.	Carnegie-Mellon University (788, 813, 836, 886)
Diebold, G.E.	Yale University (864)
Dietzsch, O.	University of São Paulo (814, 877)

Diwan, M.	Stanford University (871, 888)
Doke, T.	University of Waseda (858, 878)
Dowd, J.	University of Massachusetts-Dartmouth (818, 852)
Dover, C.B.	Brookhaven National Laboratory (864)
Dreute, J.	University of Siegen (883)
Drigert, M.	Idaho National Engineering Laboratory (877)
Dubinina, A.I.	Institute of Theory and Experimental Physics-Moscow (866)
Durant, S.	Pennsylvania State University (850)
Dutta, S.	Texas A&M University (877)
Dzierba, A.	Indiana University (818, 852)
Eckhause, M.	College of William and Mary (791, 871, 888)
Ecklund, K.	Stanford University (871, 888)
Egger, J.	Paul Scherrer Institute (865)
Egorov, O.K.	Institute of Theory and Experimental Physics-Moscow (866)
Eiseman, S.E.	Brookhaven National Laboratory (854)
Eligbaeva, G.Z.	Alma Ata, Institute of High Energy Physics (863)
Ellison, T.	Indiana University (880)
Empl, T.	Rice University (810, 854)
Endo, K.	National Laboratory for High Energy Physics (KEK) (821)
Engelage, J.	University of California Space Sciences Laboratory (858, 859, 866, 878)
Enyo, H.	University of Kyoto (886)
Erd, C.	CERN (855)
Eremenko, L.E.	Alma Ata, Institute of High Energy Physics (863)
Etkin, A.	Brookhaven National Laboratory (810, 854)
Ewell, L.	Iowa State University (862)
Farley, F.J.M.	Yale University (821)
Fatyga, M.	Brookhaven National Laboratory (814)
Fei, X.	Yale University (821)
Felawka, L.	TRIUMF (787)
Fickinger, W.	Case Western Reserve University (856)
Fitch, V.L.	Princeton University (888)
Flores, I.	Lawrence Berkeley Laboratory (878)
Foelsche, H.W.J.	Brookhaven National Laboratory (880)
Foley, K.J.	Brookhaven National Laboratory (810, 854)
Fox, D.	Los Alamos National Laboratory (814)
Foxford, T.O.	Indiana University (852)
Frank, J.S.	Brookhaven National Laboratory (787)
Franklin, G.	Carnegie-Mellon University (788, 813, 836, 885, 886)
Franz, J.	Freiburg University (813, 836, 886)

Freier, P.S.	University of Minnesota (866)
French, A.	Wayne State University (877)
Friedlander, E.M.	Lawrence Berkeley Laboratory (863)
Fung, S.-Y.	University of California-Riverside (859, 866)
Gaitinov, A.S.	Alma Ata, Institute of High Energy Physics (863)
Gang, F.	Wayne State University (877)
Ganssauge, E.R.	Marburg, Phillips University (863)
Garpman, S.	University of Lund (863)
Garrard, T.L.	Caltech (862)
Geller, J.	Brookhaven National Laboratory (880)
Germani, J.	Yale University (864)
Gerassimov, S.G.	Moscow, Lebedev Institute (863)
Gialas, I.	University of Michigan (794)
Gibbs, W. R.	Los Alamos National Laboratory (854)
Gilbert, S.	McGill University (814, 877)
Gill, D.	TRIUMF (813, 836, 885)
Ginkel, J.	College of William and Mary (791)
Glass, G.	Texas A&M University (794)
Gninenko, S.N.	Institute for nuclear Research, Academy of Sciences of Russia (Moscow) (865)
Gomez del Campo, J.	Oak Ridge National Laboratory (855)
Gonin, M.	Brookhaven National Laboratory (859, 866)
Grace, R.	Carnegie-Mellon University (788)
Graessle, S.	University of Texas-Austin (871)
Gray, L.	Bloomsburg University (856)
Greene, S.V.	Yale University (814, 864)
Greer, A.	College of William and Mary (876)
Greiner, L.	University of California, Space Science Laboratory (878)
Gribushin, A.	Moscow State University (852)
Grigoriev, D.N.	Institute for Nuclear Physics, Novosibirsk (821)
Grote, J.G.	University of Washington (863)
Gupta, S.K.	Jaipur, University of Rajasthan (863)
Gushue, S.	Brookhaven National Laboratory (850, 859, 866)
Guss, C.	Temple University (791)
Hackenburg, R.W.	Brookhaven National Laboratory (791, 854, 881)
Haeberlen, U.	Max Plank Institut fur Med. Forschung, Heidelberg (821)
Haggerty, J.S.	Brookhaven National Laboratory (787)
Halama, H.	Brookhaven National Laboratory (840)
Hall, J.	University of New Mexico (877, 864, 886)
Hall, J.	Wayne State University (814, 877)

Hallman, T.	Johns Hopkins University (810, 817, 858)
Hallman, T.J.	University of California-Los Angeles (854)
Hamagaki, H.	Institute for Nuclear Study, University of Tokyo (859, 866)
Hamann, N.	Freiburg University (813, 836)
Hancock, A.D.	College of William and Mary (871, 888)
Hansen, O.	Brookhaven National Laboratory (859, 866)
Harris, P.	University of Illinois (821)
Harshman, D.R.	AT&T Bell Laboratories (849)
Hart, G.	Los Alamos National Laboratory (791)
Haustein, P.E.	Brookhaven National Laboratory (844)
Hayano, R.	University of Tokyo (858, 859, 866, 878)
Hayano, R.S.	University of Tokyo (887)
Hayashi, S.	Institute for Nuclear Study, University of Tokyo (866)
Hayashi, S.	Brookhaven National Laboratory (859)
Hazen, E.	Boston University (821)
He, Y.	University of California at Berkeley (882)
Heckman, H.H.	Lawrence Berkeley Laboratory (858, 863, 878)
Heinrich, W.	University of Siegen (883)
Heinson, A.	University of California-Irvine (871)
Heller, K.J.	University of Minnesota (850)
Hemmick, T.K.	State University of New York at Stony Brook (814, 877)
Heppelmann, S.	Pennsylvania State University (850)
Herold, W.D.	Paul Scherrer Institute (865)
Herrmann, N.	GSI, Darmstadt (877)
Hertzog, D.	Carnegie-Mellon University (788)
Hertzog, D.	University of Illinois (821)
Hicks, K.	Ohio State University (887)
Hiebert, R.C.	Texas A&M University (835)
Highland, V.L.	Temple University (791, 888)
Hill, J.C.	Iowa State University (862)
Hirabayashi, H.	National Laboratory for High Energy Physics (KEK) (821)
Hiramatsu, S.	National Laboratory for High Energy Physics (KEK) (880)
Hoffmann, G.W.	University of Texas-Austin (871, 888)
Holynski, R.	Institute of Nuclear Physics-Krakow (866)
Homma, S.	Institute for Nuclear Study, University of Tokyo (859, 866)
Hong, B.	State University of New York-Stony Brook (814, 877)
Hou, S.	Yale University (821)
Hseuh, H.-C.	Brookhaven National Laboratory (821)
Huang, H.	Indiana University (880)
Huang, L.	Syracuse University (856)
Hughes, V.W.	Yale University (821)
Hungerford, E.V.	University of Houston (774, 781, 788, 874, 887)

Ichii, S.	National Laboratory for High Energy Physics (KEK) (821)
Igo, G.	University of California-Los Angeles (878)
Iijima, T.	University of Kyoto (813, 836, 885, 886)
Ikeda, Y.	Institute for Nuclear Study, University of Tokyo (859)
Imai, K.	University of Kyoto (813, 836)
Irwin, G.	Stanford University (791, 871, 888)
Isakov, V.V.	Institute for Nuclear Research, Academy of Sciences of Russia (Moscow) (865)
Ishida, K.	University of Riken (821)
Ismail, A.Z.M.	State University of New York-Buffalo (875)
Ito, M.M.	Princeton University (787)
Iwaskaki, M.	University of Tokyo (821)
Jackson, J.W.	Brookhaven National Laboratory (821)
Jacobsson, B.	University of Lund (863)
Jain, P.L.	State University of New York-Buffalo (875)
Jansen, D.M.	Los Alamos National Laboratory (890)
Jayananda, K.	University of Pittsburgh (814)
Johns, K.A.	University of Minnesota (817, 850)
Johnson, R.R.	TRIUMF (835)
Jones, B.	Indiana University (880)
Jones, T.	University of Illinois (821)
Jones, W.V.	Louisiana State University (866)
Joyce, D.	College of William and Mary (791)
Judek, B.	Carleton University/NRC, Ottawa (863)
Jungmann, K.	University of Heidelberg (821)
Jurak, A.	Institute of Nuclear Physics-Krakow (866)
Kachroo, S.	University of Jammu (863)
Kalogeropoulos, T.	Syracuse University (856)
Kalyachkina, G.S.	Alma Ata, Institute of High Energy Physics (863)
Kane, J.R.	College of William and Mary (791, 871, 888)
Kaneko, H.	Kyoto University (859, 866)
Kang, J.	University of California-Riverside (859, 866)
Kanygina, E.K.	Alma Ata, Institute of High Energy Physics (863)
Kapusta, J.	University of Minnesota (866)
Karabova, M.	Dubna, JINR (863)
Kashiwagi, T.	University of Waseda (858, 878)
Kaspar, H.	Paul Scherrer Institute (865)
Kaufman, S.	Argonne National Laboratory (802, 859, 866)
Kaufman, W.A.	University of Michigan (794)
Kaul, G.L.	University of Jammu (863)

Kehoe, W.	Massachusetts Institute of Technology (859, 866)
Kenney, C.	College of William and Mary (791)
Kern, W.	University of Massachusetts-Dartmouth (818, 852)
Kettell, S.	Temple University (791, 871, 888)
Kharlamov, S.P.	Moscow, Lebedev Institute (863)
Khazin, B.I.	Institute for Nuclear Physics, Novosibirsk (821)
Khiari, F.Z.	University of Michigan (794)
Kikuchi, J.	University of Waseda (858, 878)
Kim, B.	Wayne State University (877)
Kimura, K.	Kyushu University (866)
King, E.	University of Massachusetts-Dartmouth (818)
Kinnison, W.W.	Los Alamos National Laboratory (791)
Kinoshita, T.	Cornell University (821)
Kirk, H.	Brookhaven National Laboratory (818)
Kirk, P.	Louisiana State University (858)
Kishimoto, T.	University of Houston (788)
Kishimoto, T.	Brookhaven National Laboratory (835)
Kitching, P.	TRIUMF (787)
Klarmann, J.	Washington University (869)
Klein, J.	Princeton University (888)
Kmit, M.	Brookhaven National Laboratory (850)
Knibbe, P.	University of Pennsylvania (791)
Koch, E.	Marburg, Phillips University (863)
Koehler, A.	Harvard Cyclotron Laboratory (856)
Kolganova, E.D.	Institute of Theory and Experimental Physics-Moscow (866)
Konaka, A.	TRIUMF (787)
Konigsberg, J.	University of California-Los Angeles (791)
Kormanyos, C.	University of Colorado (874)
Koss, T.	University of Washington (863)
Kossler, W.J.	College of William and Mary (876)
Kramer, M.A.	City College of New York/Brookhaven National Laboratory (810, 854, 881)
Krasnov, S.A.	Dubna, JINR (863)
Kraus, D.	University of Pittsburgh (814)
Krauss, D.E.	University of Pittsburgh (865)
Krauss, R.A.	Texas A&M University (835)
Krienen, F.	Boston University (821)
Krisch, A.D.	University of Michigan (794)
Kruglov, N.	Moscow State University (852)
Kuang, Y.	College of William and Mary (871, 888)
Kubic, J.	University of California at Los Angeles (791)
Kumar, B. Shiva	Yale University (864)
Kumar, V.	Jaipur, University of Rajasthan (863)
Kuno, Y.	TRIUMF (787)

Kuraev, E.A.	Institute for Nuclear Physics, Novosibirsk (821)
Kurita, K.	University of Tsukuba (859, 866)
Kurokawa, S.	National Laboratory for High Energy Physics (KEK) (821)
Kwon, Y.	State University of New York-Stony Brook (877)
Kycia, T.F.	Brookhaven National Laboratory
Lacasse, R.	McGill University (814, 877)
Lahab, K.	Wayne State University (877)
Lajoie, J.	Yale University (864)
Lal, P.	Jaipur, University of Rajasthan (863)
Lang, K.	Stanford University (791)
Lang, K.	University of Texas-Austin (871, 888)
Lankford, W.F.	George Mason University (876)
Larionova, V.G.	Moscow, Lebedev Institute (863)
Larsen, R.	Brookhaven National Laboratory (821)
Larson, B.	Ohio State University (887)
Lazarus, D.M.	Brookhaven National Laboratory (840, 865)
Ledoux, R.J.	Massachusetts Institute of Technology (859)
Lee, D.M.	Los Alamos National Laboratory (791)
Lee, S.Y.	Indiana University (880)
Lee, Y.Y.	Brookhaven National Laboratory (821, 880)
Leitch, M.J.	Los Alamos National Laboratory (890)
Lepetan, V.N.	Alma Ata, Institute of High Energy Physics (863)
LeVine, M.J.	Brookhaven National Laboratory (859, 866)
Lewis, R.A.	Penn State University (864)
Li, K.K.	Brookhaven National Laboratory (787)
Li, Q.	Texas A&M University (877)
Li, Q.	Wayne State University (814, 877)
Li, Y.X.	Changsha, Hunan Ed. Inst. (863)
Lichtenstadt, J.	Tel-Aviv University (835)
Lin, A.M.T.	University of Michigan (794)
Lindenbaum, S.J.	City College of New York/Brookhaven National Laboratory (810, 854, 881)
Lindenbusch, R.	Indiana University (852)
Lindstrom, P.J.	Lawrence Berkeley Laboratory (858, 863, 878)
Lissauer, D.	Brookhaven National Laboratory (814, 855, 877)
Littenberg, L.S.	Brookhaven National Laboratory (787)
Liu, Z.G.	Changsha, Hunan Ed. Inst. (863)
Llope, W.	State University of New York at Stony Brook (814, 877)
Lokanathan, S.	Jaipur, University of Rajasthan (863)
Longacre, R.S.	Brookhaven National Laboratory (810, 854, 881)
Lord, J.	University of Washington (863)
LoSecco, J.	University of Notre Dame (852)

Love, W.A.	Brookhaven National Laboratory (810, 854)
Loveland, W.	Oregon State University
Lowder, D.M.	University of California at Berkeley (882)
Lowe, J.	University of Birmingham (813, 836)
Lowe, J.	University of New Mexico (885, 886)
Lowenstein, D.I.	Brookhaven National Laboratory (850)
Ludlam, T.	Brookhaven National Laboratory (814, 877)
Lukaszew, C.	Wayne State University (814, 877)
Luke, G.	Columbia University (876)
Luo, S.B.	Linfen, Shanxi Normal (863)
Lysenko, W.	Los Alamos National Laboratory (821)
Ma, H.	Brookhaven National Laboratory (865)
Madansky, L.	Johns Hopkins University (810, 817, 854)
Macdonald, J.A.	TRIUMF (787)
Magahiz, R.	Carnegie-Mellon University (885, 886)
Maher, C.	Carnegie-Mellon University (788, 813, 836)
Majka, R.	Yale University (814, 864)
Makdisi, Y.I.	Brookhaven National Laboratory (850, 880)
Manak, J.	University of Notre Dame (852)
Mane, S.	Brookhaven National Laboratory (821, 880)
Manglos, S.	SUNY Health Science Center (856)
Mangotra, L.K.	University of Jammu (863)
Mao, L.	Louisiana State University (858)
Marcin, M.R.	University of Texas-Austin (871, 888)
Mardor, Il	Tel-Aviv University (850)
Mardor, Y.	Tel-Aviv University (835, 850)
Margulies, J.	Stanford University (791)
Mark, S.K.	McGill University (814, 877)
Marlow, D.R.	Princeton University (787)
Marshak, M.L.	University of Minnesota (850)
Marshall, T.	Indiana University (818)
Martin, R.D.	College of William and Mary (871)
Masaike, A.	University of Kyoto (813, 836, 886)
Mashata, K.	National Laboratory for High Energy Physics (KEK) (821)
Maslennikova, N.V.	Moscow, Lebedev Institute (863)
Matheus, R.	Wayne State University (814, 877)
Mathiazhagen, C.	University of California at Irvine (791)
Matsik, S.	University of Pittsburgh (884)
May, M.	Brookhaven National Laboratory (781, 885, 888)
Mayes, B.W.	University of Houston (774, 781, 874)
Mazavia, D.	High Energy Physics Institute, Tbilisi State University (865)
McCorkle, S.	Brookhaven National Laboratory (877)

McCrary, R.	Carnegie-Mellon University (788)
McDonough, J.	University of Texas-Austin (871, 888)
McFarlane, W.K.	Temple University (791, 871)
McKee, R.J.	Los Alamos National Laboratory (791)
McPherson, R.	Princeton University (787)
Melese, P.	University of California-Los Angeles (791)
Melissinos, A.C.	University of Rochester (840)
Meng, W.-Z.	Brookhaven National Laboratory (821)
Merrill, F.	Carnegie-Mellon University (885, 886)
Meyers, P.D.	Princeton University (787)
Miake, Y.	University of Tsukuba (859, 866)
Michael, R.	Ohio State University (887)
Miettinen, H.E.	Rice University (810, 817)
Miller, C.A.	TRIUMF (794)
Miller, J.P.	Boston University (821)
Mills, A.P.	AT&T Bell Laboratories (849)
Milner, E.C.	Los Alamos National Laboratory (791)
Minor, E.	Pennsylvania State University (850)
Missimer, J.	Paul Scherrer Institute (865)
Mitchell, J.	Yale University (814, 864)
Mitchell, J.	University Space Research Association (878)
Mitra, I.S.	Chandigarh, Panjab (863)
Miyake, K.	University of Kyoto (813, 836)
Mizumachi, Y.	National Laboratory for High Energy Physics (KEK) (821)
Moinester, M.A.	Tel-Aviv University (835)
Molzon, W.R.	University of California-Irvine (791, 871, 888)
Mookerjee, S.	Jaipur, University of Rajasthan (863)
Mori, Y.	National Laboratory for High Energy Physics (KEK) (880)
Morris, T.W.	Brookhaven National Laboratory (810, 854)
Morrison, D.	Massachusetts Institute of Technology (859, 866)
Morse, R.J.	Massachusetts Institute of Technology (859, 866)
Morse, W.	Brookhaven National Laboratory (821)
Moskowitz, B.	Brookhaven National Laboratory (859, 866)
Mukhopadhyay, A.	State University of New York-Buffalo (875)
Murphy, C.	Indiana University (852)
Mutchler, G.S.	Rice University (810, 817, 818, 854)
Muthuswami, M.	State University of New York-Stony Brook (877)
Nagamine, K.	University of Tokyo (821)
Nagamiya, S.	Columbia University (858, 859, 866, 878)
Nakano, T.	TRIUMF (787)
Nambodiri, M.N.	Lawrence Livermore Laboratory (859, 866)
Nayak, T.	Columbia University (859, 866)

Nefkens, B.M.K.	University of California-Los Angeles (890)
Nelson, J.	University of Birmingham (813, 836, 886)
Nezrick, F.A.	Fermilab (840)
Nguyen, C.T.	University of Texas-Austin (871, 888)
Nicholson, H.	Mt. Holyoke College (850)
Normand, L.	McGill University (877)
Northcliff, L.C.	Texas A&M University (794)
Numao, T.	TRIUMF (787)
O'Brien, E.	Brookhaven National Laboratory (814, 877)
O'Fallon, J.R.	University of Notre Dame/U.S. Dept. of Energy (794)
Okada, K.	University of Kyoto-Sangyo (813, 836, 886)
Olness, J.	Brookhaven National Laboratory (859, 866)
Olshevsky, R.	TRIUMF (835)
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Orlov, Y.	Cornell University (821)
Orlova, G.I.	Moscow, Lebedev Institute (863)
Ostrvidov, A.	Moscow State University (852)
Otterlund, I.	University of Lund (863)
Ouimette, D.	Stanford University (791, 871, 888)
Outa, H.	INS (887)
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Palsania, H.S.	Jaipur, University of Rajasthan (863)
Park, S.	Massachusetts Institute of Technology (866)
Parsons, C.G.	Massachusetts Institute of Technology (859)
Peaslee, D.C.	University of Maryland (791, 834)
Peng, J.C.	Los Alamos National Laboratory (890)
Perera, A.G.U.	University of Pittsburgh (884)
Peresadko, N.G.	Moscow, Lebedev Institute (863)
Peterson, R.J.	University of Colorado (874)
Phelps, R.A.	University of Michigan (794)
Piasetsky, E.	Tel-Aviv University (835, 850)
Piekarz, H.	University of Houston (774)
Pile, P. H.	Brookhaven National Laboratory (774, 781, 788, 813, 835, 836, 865, 885, 886, 890)
Pinsky, L.S.	University of Houston (774, 781, 874)
Platner, E.D.	Brookhaven National Laboratory (810, 854)
Plyushev, V.A.	Leningrad, Khlopin Radium Institute (863)

Polychronakos, V.	Brookhaven National Laboratory (877)
Pope, K.	Yale University (878)
Pottag, F.M.	Lawrence Berkeley Laboratory (863)
Poutissou, J.-M.	TRIUMF (787)
Poutissou, R.	TRIUMF (787)
Pozharova, E.A.	Institute of Theory and Experimental Physics-Moscow (866)
Prasad, S.C.	SUNY Health Science Center (856)
Price, P.B.	University of California-Berkeley (882)
Price, J.W.	University of California-Los Angeles (890)
Prodell, A.	Brookhaven National Laboratory (821, 840)
Proskuryakov, A.	Moscow State University (852)
Protopopescu, S.D.	Brookhaven National Laboratory (818)
Pruneau, C.	McGill University (814, 864, 877)
Pruneau, C.	Wayne State University (814, 877)
Qin, Y.M.	Linfen, Shanxi Normal (863)
Quinn, B.	Carnegie-Mellon University (788, 813, 836, 885, 886)
Rabin, M.S.Z.	University of Massachusetts (864)
Raniwala, R.	Jaipur, University of Rajasthan (863)
Raniwala, S.	Jaipur, University of Rajasthan (863)
Rankowitz, S.	Brookhaven National Laboratory (821)
Ramsay, D.	University of Manitoba (813, 836, 885)
Rao, M.	State University of New York-Stony Brook (814, 877)
Rao, N.K.	University of Jammu (863)
Rappoport, V.M.	Moscow, Lebedev Institute (863)
Ratner, L.G.	Brookhaven National Laboratory (791, 880)
Ray, A.	Oak Ridge National Laboratory (855)
Raylman, R.R.	University of Michigan (794)
Raymond, R.S.	University of Michigan (794)
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Reed, J.	Syracuse University (856)
Rehak, P.	Brookhaven National Laboratory (865)
Reinhart, R.	University of Illinois (821)
Remsberg, L.P.	Brookhaven National Laboratory (859, 866)
Rhee, J.T.	Marburg, Phillips University (863)
Rhodes, M.	University of Illinois (821)
Riley, P.J.	University of Texas-Austin (871, 888)
Ritchie, J.	Stanford University (791)
Ritchie, J.L.	University of Texas-Austin (871, 888)
Ritter, J.	University of Illinois (821)
Rivers, C.	University of Michigan (850)

Rizzo, C.	Trieste (840)
Roberts, B.L.	Boston University (821)
Roberts, J.B.	Rice University (794, 810, 817, 818)
Robinson, D.K.	Case Western Reserve University (856)
Roehrich, D.	Brookhaven National Laboratory (859, 866)
Rosati, M.	McGill University (814, 877)
Roser, T.	University of Michigan (794)
Roser, T.	Brookhaven National Laboratory (880)
Rössle, E.	Freiburg University (813, 836, 886)
Rothschild, P.	Massachusetts Institute of Technology (859, 866)
Rotondo, F.	Yale University (814, 864)
Roy, J.	TRIUMF (787)
Rozon, M.	Carnegie-Mellon University (813, 836)
Rubin, P.	University of California-Los Angeles (791)
Ruchti, R.C.	University of Notre Dame (852)
Rusch, G.	University of Siegen (883)
Rusek, A.	University of New Mexico (813, 836, 885, 886)
Russell, J.J.	University of Massachusetts-Dartmouth (850)
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Sakitt, M.	Brookhaven National Laboratory (856)
Sakurai, H.	University of Tokyo (859, 866)
Salmanova, N.A.	Moscow, Lebedev Institute (863)
Sambamurti, A.K.	Brookhaven National Laboratory (787)
Sanders, G.H.	Los Alamos National Laboratory (791)
Sandweiss, J.	Yale University (814, 864)
Sangster, T.	Lawrence Livermore Laboratory (859, 866)
Sato, T.	National Laboratory for High Energy Physics (KEK) (821, 880)
Saulys, A.C.	Brookhaven National Laboratory (810, 854)
Sawafta, R.	Brookhaven National Laboratory (813, 835, 836, 856, 874, 885, 886, 887, 890)
Schmitt, H.	Freiburg University (813, 836, 886)
Schone, H.E.	College of William and Mary (876)
Schukraft, J.	CERN (855)
Schumacher, R.	Carnegie-Mellon University (813, 836, 885, 886)
Schwandt, P.	Indiana University (880)
Schwartz, A.J.	Princeton University (888)
Sedykh, S.	State University of New York-Stony Brook (877)
Seibert, D.	University of Minnesota (866)
Selen, M.S.	Princeton University (787)
Semertzidis, Y.	Brookhaven National Laboratory (821, 840)
Sengupta, K.	Louisiana State University (866)

Seto, R.	University of California-Riverside (859, 866)
Seydoux, J.	Carnegie-Mellon University (788)
Seyfarth, H.	Forschungszentrum Jülich (890)
Shabratova, G.S.	Dubna, JINR (863)
Shakova, T.I.	Alma Ata, Institute of High Energy Physics (863)
Shapira, D.	Oak Ridge National Laboratory (855)
Shatunov, M.	Institute for Nuclear Physics, Novosibirsk (821)
Sheen, J.	Wayne State University (877)
Shephard, W.D.	University of Notre Dame (852)
Shigaki, K.	University of Tokyo (866)
Shimizu, Y.	University of Tokyo (858, 866, 887)
Shoemaker, F.C.	Princeton University (787)
Shiva Kumar, B.	Yale University (814, 878)
Shutt, R.	Brookhaven National Laboratory (821)
Simon-Gillo, J.	Los Alamos National Laboratory (814)
Simonius, M.	ETH, Zurich (794)
Singh, G.	State University of New York-Buffalo (875)
Sinyov, L.N.	Moscow State University (852)
Sivertz, M.	Temple University (791)
Skeens, J.	Rice University (810, 817)
Skelding, D.	University of Washington (863)
Skelly, J.F.	Brookhaven National Laboratory (880)
Skorotko, T. Yu.	Institute of Theory and Experimental Physics-Moscow (866)
Slater, W.E.	University of California-Los Angeles (791)
Slaughter, A.J.	Yale University (864)
Šlaus, I.	Ruder Boskovic Institute (890)
Smirnitski, V.A.	Institute of Theory and Experimental Physics-Moscow (866)
Smith, A.J.S.	Princeton University (787)
Smith, G.	Brookhaven National Laboratory (840)
Smith, G.A.	Penn State University (864)
Smith, P.T.	Indiana University (852)
Snow, G.	University of Michigan (850)
Sobolewski, Z.	Syracuse University (856)
Soderstrom, K.	University of Lund (863)
Solodov, E.	Institute for Nuclear Physics, Novosibirsk (821)
Solovieva, Z.I.	Leningrad, Khlopin Radium Institute
Soltz, R.	Massachusetts Institute of Technology (859, 866)
Soluk, R.	TRIUMF (787)
Sonnadara, U.	University of Pittsburgh (814, 877)
Soukas, A.	Brookhaven National Laboratory (880)
Spinka, H.	Argonne National Laboratory (880)
Stachel, J.	State University of New York-Stony Brook (814, 877)
Staendecke, K.	Marburg, Phillips University (863)
Stankus, P.	Columbia University (858, 859, 866, 878)

Starinsky, N.	McGill University (877)
Steadman, S.G.	Massachusetts Institute of Technology (859, 866)
Stearns, R.	Vassar College (774, 781, 788, 813, 835, 836, 885)
Stenlund, E.	University of Lund (863)
Stephans, S.F.	Massachusetts Institute of Technology (859, 866)
Sternlieb, B.	Columbia University (876)
Stevens, A. J.	Brookhaven National Laboratory (787)
Stevenson, P.M.	Rice University (817)
Stewart, J.A.	University of Michigan (794)
Stoenner, R.W.	Brookhaven National Laboratory (844)
Stone, E.C.	Caltech (862)
Strand, R.C.	Brookhaven National Laboratory (787)
Strausz, S.	University of Washington (863)
Stronach, C.E.	Virginia State University (876)
Sugitate, T.	Hiroshima University (866)
Sukaton, I.	Carnegie-Mellon University (810, 836, 886)
Sulak, L.R.	Boston University (821)
Sulanke, T.	Indiana University (852)
Sum, V.	University of Manitoba (813, 836)
Sung, T.	Massachusetts Institute of Technology (859, 866)
Sutter, R.	Brookhaven National Laboratory (788, 813, 835, 836, 856, 874, 885, 886, 887, 890)
Švarc, A.	Ruder Boskovic Institute (890)
Szarska, M.	Institute of Nuclear Physics-Krakow (866)
Szymanski, J.	Carnegie-Mellon University (788, 813)
Szymanski, J.	Indiana University Cyclotron Facility (836)
Taeger, S.	University of Notre Dame (852)
Takagui, M.	University of São Paulo (814, 877)
Takai, H.	Brookhaven National Laboratory (814, 865, 877)
Takeutchi, F.	University of Kyoto-Sangyo (813, 836, 885)
Tamura, H.	University of Tokyo (866, 887)
Tanaka, M.	Brookhaven National Laboratory (866)
Tanaka, K.	National Laboratory for High Energy Physics (KEK) (858, 878)
Tanaka, Y.	Institute for Nuclear Study, University of Tokyo (866)
Tanaka, Y.	Kyushu University (859)
Tang, L.	CEBAF
Tang, L.G.	University of Houston (788)
Tannenbaum, M.J.	Brookhaven National Laboratory (859, 866)
Teng, L.	Argonne National Laboratory (880)
Tepikian, S.	Brookhaven National Laboratory (880)
Terwilliger, K.M.	University of Michigan (794)
Thomas, J.H.	Lawrence Livermore Laboratory (859, 866)

Thompson, J.	University of Pittsburgh (865)
Thompson, P.A.	Brookhaven National Laboratory (821)
Throwe, T.	Brookhaven National Laboratory (814, 864)
Tincknell, M.	Oak Ridge National Laboratory (855)
Tippens, W.B.	University of California-Los Angeles (890)
Tolstov, K.D.	Dubna, JINR (863)
Tonse, S.	Lawrence Berkeley Laboratory (859, 866)
Toshkov, S.	Rice University (854)
Trang, Q.	Stanford University (791)
Tretvakova, M.I.	Moscow, Lebedev Institute (863)
Truoel, P.	University of Zurich (865)
Trzaska, W.	Texas A&M University (877)
Trzupek, A.	Institute of Nuclear Physics-Krakow (866)
Turcot, A.S.	TRIUMF (787)
Uemuera, Y.J.	Columbia University (876)
Ueno, S.	University of Tsukuba (866)
Underwood, D.G.	Argonne National Laboratory (880)
Urheim, J.	University of Pennsylvania (791)
van Asselt, W.	Brookhaven National Laboratory (880)
van Dijk, J.H.	Brookhaven National Laboratory (859, 866)
Van Guilder, B.S.	University of Michigan (794)
van Oers, W.	University of Manitoba (813, 836, 885)
Vaziri, K.	Rensselaer Polytechnic Institute (881)
Vetterli, M.C.	TRIUMF (794)
Videbaek, F.	Brookhaven National Laboratory (859, 866)
Vokal, S.	Dubna, JINR (863)
Voloshin, S.	University of Pittsburgh (877)
von Walter, P.	University of Heidelberg (821)
Vossnack, O.	Columbia University (859, 866)
Vuaridel, B.	University of Michigan (794)
Vulcan, W.F.	College of William and Mary (791, 888)
Vutsadakis, V.	Massachusetts Institute of Technology (859)
Waddington, C.J.	University of Minnesota (866, 869)
Wagner, D.	University of California at Los Angeles (791)
Wang, C.	Boston University (821)
Wang, F.Q.	Columbia University (859)
Wang, G.	McGill University (814, 877)
Wang, K.	Syracuse University (856)

Wang, M.J.	University of California-Los Angeles (890)
Wang, Y.	Columbia University (859)
Wang, Z.	Louisiana State University (858)
Ware, C.B.	University of Texas-Austin (871, 888)
Waters, L.	State University of New York-Stony Brook (814)
Wefel, J.P.	Louisiana State University (866)
Wegner, H.	Brookhaven National Laboratory (859, 866)
Weise, R.	Tel-Aviv University (835)
Welsh, R.E.	College of William and Mary (791, 871, 878, 888)
Wells, S.	University of Indiana (887)
Weng, Z.Q.	Changsha, Hunan Ed. Inst. (863)
Wessels, J.	State University of New York-Stony Brook (877)
Weyer, H.	University of Basel (865)
Weygand, D.	Brookhaven National Laboratory (852)
White, C.	University of Minnesota (850)
White, D.B.	University of California-Los Angeles (890)
White, S.	Brookhaven National Laboratory (888)
Whyley, R.J.	College of William and Mary (791)
Wiegel, B.	University of Siegen (883)
Wienands, U.	TRIUMF (880)
Wilkes, R.J.	University of Washington (863)
Willis, W.J.	CERN (855)
Willutski, H.	Brookhaven National Laboratory (817, 852)
Wilczynska, B.	Institute of Nuclear Physics-Krakow (866)
Wilczynski, H.	Institute of Nuclear Physics-Krakow (866)
Winger, J.A.	Michigan State University (862)
Winkel, E.	University of Siegen (883)
Winter, R.G.	College of William and Mary (791, 871, 888)
Winn, D.	Fairfield University (821)
Wise, J.	University of Colorado (874)
Wissink, S.W.	University of Indiana (887)
Witkowski, M.	College of William and Mary (871, 888)
Witzig, C.H.	Brookhaven National Laboratory (787)
Wohn, F.K.	Iowa State University (862)
Wojcicki, S.G.	Stanford University (791, 871, 888)
Wolf, K.	Texas A&M University (814)
Wolfe, D.	University of New Mexico (813, 814, 836, 865, 877, 885, 886)
Wolin, E.J.	Yale University (864)
Wolter, W.	Institute of Nuclear Physics-Krakow (866)
Wong, V.K.	University of Michigan (794)
Woodle, K.	Brookhaven National Laboratory (821)
Woodruff, D.S.	Massachusetts Institute of Technology (859, 866)
Woody, C.	Brookhaven National Laboratory (814, 854, 877)
Worm, S.	University of Texas-Austin (871, 888)

Worstell, W.	Boston University (821)
Wosiek, B.	Institute of Nuclear Physics-Krakow (866)
Wozniak, K.	Institute of Nuclear Physics-Krakow (866)
Wright, R.	Lawrence Berkeley Laboratory (878)
Wu, J.Y.	Pennsylvania State University (850)
Wu, Y.D.	Columbia University (859, 866)
Xia, Y.L.	Changsha, Hunan Ed. Inst. (863)
Xiong, H.	Wayne State University (877)
Xu, G.F.	Beijing, Acadmica Sinica (863)
Xu, N.	State University of New York-Stony Brook (814, 877)
Yamamoto, A.	National Laboratory for High Energy Physics (KEK) (821)
Yang, X.	Columbia University (859)
Yavin, A.I.	Tel-Aviv University (835)
Yi, X.	Carnegie-Mellon University (788)
Yokosawa, A.	Argonne National Laboratory (880)
Yokoya, K.	National Laboratory for High Energy Physics (KEK) (880)
Young, T.	Syracuse University (856)
Zachary, D.	Massachusetts Institute of Technology (859, 866)
Zajc, W.A.	Columbia University (859, 866)
Zalikhonov, B.Z.	Joint Institute for Nuclear Research, Dubna (865)
Zavattini, E.	Trieste (840)
Zeller, M.	Yale University (865)
Zeps, V.	Carnegie-Mellon University (810, 836, 885, 886)
Zhang, C.	Temple University (791)
Zhang, D.H.	Linfen, Shanxi Normal (863)
Zhang, Y.C.	State University of New York-Stony Brook (814, 877)
Zhang, Z.	University of Pittsburgh (814)
Zhao, K.	Brookhaven National Laboratory/City College of New York (881)
Zheng, P.Y.	Beijing, Acadmica Sinica (863)
Zhou, B.	Boston University (858)
Zhu, Y.	City College of New York (881)
Zieminska, D.	Indiana University (818, 852)
Ziock, H.J.	Los Alamos National Laboratory (791)
Zou, C.	State University of New York-Stony Brook (814, 877)
zu Putlitz, G.	University of Heidelberg (821)
Zybert, R.	University of Birmingham (813, 836, 886)

APPENDIX

***During its February 1993 meeting,
the HENP Program Advisory Committee
approved the following experiments:***

Experiment 889 - Long Baseline Neutrino Oscillation Search

University of Pennsylvania

M. Albert, A.K. Mann

Brookhaven National Laboratory

M.J. Murtagh

Spokesman:

A.K. Mann

A proposal is made here for a long baseline, ν_μ disappearance neutrino oscillation experiment at the AGS. The principal aim of the experiment is to explore the region in the vacuum oscillation space, Δm^2 vs $\sin^2 2\theta$, suggested by the results from studies of the interactions of atmospheric neutrinos in underground detectors. The proposed experiment consists of three linearly aligned, widely spaced, essentially similar, massive imaging water Cherenkov counters to be used in conjunction with a new, high intensity neutrino beam. The experiment will yield data of high statistical precision and small systematic uncertainty. It will extend the explored region in Δm^2 vs $\sin^2 2\theta$ by two orders of magnitude relative to previous accelerator based experiments, and has the prospect, if the atmospheric neutrino results are correct--of definitive identification of neutrino oscillations in the ν_μ -disappearance channel and of the specific values of Δm^2 and $\sin^2 2\theta$ involved. It may be the only means of determining a small ν_τ mass.

E891 - A Search for Quark Matter (QGP) and Other New Phenomena Utilizing Au-Au Collisions at the AGS

Brookhaven National Laboratory

S.E. Eiseman, A. Etkin, K.J. Foley,
R.W. Hackenburg, R.S. Longacre, W.A. Love,
E.D. Planter, A.C. Saulys

**Brookhaven National Laboratory
and City College of New York**

S. J. Lindenbaum

University of California, Davis

D.A. Cebra

City College of New York

C.S. Chan, E. Efstathiadis, M.A. Kramer, K. Zhao,
Y. Zhu

Rice University

S. Ahmad, B.E. Bonner, J.A. Buchanan,
J.M. Clement, G.S. Mutchler

Spokesman:

E.D. Platner

A program is proposed for studying Au-Au collisions at the AGS by measuring the angles and momenta of charged tracks, K_s^0 's and Λ 's using the TPC's and trigger detectors from E810. In order to handle the higher track multiplicities produced by Au beams, a modified geometric arrangement of the TPC modules will be used. This program will allow the experimenters to look for anomalous behavior in rapidities (or pseudorapidities), multiplicity, strangeness enhancements, $P_{\perp}(E_{\perp})$, energy flow; possibly observe Hanbury-Brown and Twiss effects and other new phenomena. These observations will be on an event-by-event basis so that particularly interesting classes of events can be selected and added together to search for new effects (like strangelets) implying a QGP or other new states of matter in a manner which tends to maximize signal-to-background ratios.

E892 - Capture from Pair Production

Lawrence Berkeley Laboratory A. Belkacem, B. Feinberg, H. Gould

Brookhaven National Laboratory P. Thieberger, H. Wegner (retired)

Iowa State University J. Hill

Stanford University W. Meyerhof

Spokesman: H. Gould

The experimenters propose to measure the cross section for capture from pair production and free pair production of 10 GeV/n Au^{79+} on Au collisions. This will provide the first measurement of capture from pair production at energies above the 1 GeV/n region. The results are essential to understand the process, to guide ongoing efforts, to develop a nonperturbative theory, and to supply important data for the operations of RHIC. Capture from pair production is the process in which an electron-positron pair is produced by the transient electromagnetic field from a relativistic heavy-ion atomic collision (no nuclear contact) and the electron emerges bound to the projectile ion. It is unique because it is the only recombination process in which the cross section *increases* with energy at relativistic energies. At sufficiently high energies it is predicted to become the dominant recombination mechanism.

Figure 5. Schematic diagram of the apparatus. The adiabatically decreasing solenoid field (shown schematically by the coil height) transports and focuses the positrons. Small dipoles at either end deflect the positrons and electrons into the scintillator detectors. These detectors measure the positron energy and, from time of flight, determine the emission angle of the positron. Positrons are verified by the 511 keV annihilation radiation detected in the gamma detectors. A large dipole magnet(s) located downstream from the APS separates the charge states of the emerging ions.

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