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AGS EXPERIMENTS — 1985, 1986, 1987

J.C. Depken

January 1987

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AGS DEPARTMENT

BROOKHAVEN NATIONAL LABORATORY
ASSOCIATED UNIVERSITIES, INC.
UPTON, LONG ISLAND, NEW YORK 11973

UNDER CONTRACT NO. DE-AC02-76CH00016 WITH THE

UNITED STATES DEPARTMENT OF ENERGY

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1/10/87

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• AGS Experiments - 1985, 1986, and 1987
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This report contains:

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This is a **fourth edition**. Please forward suggestions and changes for future editions to:

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

Mr. Rippie Bowman designed the cover. The cutoff date for approved experiments to be included in the report was January 1987.

Separated Beams					Flux/ 10^{12} protons on target								
Beam	GeV/c	$\frac{\Delta p}{p}$ (%) (FMM)	Prod. Angle	Ω (msr)	K^+	K^-	p	$\bar{p}$	π^+	π^-	@ GeV/c	Purity	Remarks
B2	1.5-6(K) 1.5-9($\bar{p}$)	5	3°	0.3	2.7×10^5	1.2×10^5	2×10^7	10^5	4×10^7	3×10^7	4	$\pi^-/K^- \sim 3$ $p/\bar{p} \sim 3/4$	To MPS.
B4	This branch similar to B2, but not available in FY 1987.												
C2, C4	< 1.1	4	10.5°	2.6	4×10^4	1.2×10^4	2×10^7	2×10^3	8×10^7	8×10^7	0.75	$\pi^-/K^- \sim 10$	L = 15 m.
C6, C8	< 0.8	6	5°	10	2×10^5	6×10^4	1.4×10^8	1.4×10^4	6×10^8	6×10^8	0.7	$\pi^-/K^- \sim 20$	L = 15 m.
Unseparated Charged Beams													
A1*	5-24	3	0°	0.2						10^6	22		To MPS: L = 130 m; 25 cm B tgt.
B1*	5-28	3	0°	0.05			3×10^7		6×10^6	2×10^6	14		Primarily Heavy Ions.
C1*	1-24	5	0°	0.8	6×10^6	7×10^5	2×10^8	1.4×10^5	7×10^7	5×10^7	13	$\mu^-/\pi^- = 0.3$	L = 61 m.
D6	0-6	16	2°	0.5	2×10^7	7×10^6	2×10^8		2×10^8	1×10^8	6		L = 32 m.
Neutral Beams								K_L	n				
A3*	1-28		0°	0.045				10^8	3×10^9		1-28		Alternates with A1; L = 8 m.
B5*	1-28		1-4.5°(V)	0.1				5×10^7	1.5×10^9		9-28		Based on E791 est; L = 10 m.
Muon Channel						μ^-							
D2, D4	.05-.15(μ)	9(π)	55°(π)	50(π)		2×10^6					0.10		Flux in 100 cm ² with $\Delta p/p = \pm 2\%$
Neutrino Beam						ν	$\bar{\nu}$						
U						$2 \times 10^9/\text{m}^2$ $10^8/\text{m}^2$	$1.4 \times 10^9/\text{m}^2$				1.4×10^{13} ppp typical		Fast spill, flux avg. over 1.5m radius. Wide Band Horn, $\langle E_\nu \rangle = 1.4 \text{ GeV/c}$ Narrow Band Horn, $\langle E_\nu \rangle = 1.3 \text{ GeV/c}$ $\pm 15\%$

AGS SCHEDULE AS RUN

FY86

RUNNING
PARASITIC RUNNING

BY: D. LAZARUS
 DATE: AS RUN

FY87

FY86

LONG RANGE AGS SCHEDULE

- SUBJECT TO CHANGE -
(86 HOURS PER WEEK)

■■■■■■■■ RUNNING
■■■■■■■■ PARASITIC RUNNING

BY: D. LAZARUS
DATE: 1-5-87

FY87

FY88

BEAM	EXP. NO.	EXPERIMENTER	HRS.	OCT.	NOV.	DEC.	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE
A1	747	LINDENBAUM	1007																					
A1	810	LINDENBAUM/PLATNER	1000																					
A1	818	CHUNG	1000																					
A1	793	PRICE	1000																					
A1	804	AHLEN/TARLE	1000																					
A1	806	HEINRICH	1000																					
A1	808	JONES	1000																					
A1	815	OTTERLUND/WILKES	1000																					
A1	826	ITOH	1000																					
A1	831	SHIDA	1000																					
A2		TEST BEAM																						
A3	780	MORSE/SCHMIDT	1000																					
B1	802	HANSEN/HAGAMIYA	1000																					
B2	771	CHUNG	1000																					
B4		TEST BEAM																						
B5	791	WOLZON/COUSINS	1000																					
C1	814	BRAUN-MUNZINGER	1000																					
C1	834	CARROLL/HEFFELMAN	1000																					
C1	836	BUNCE/RUSSELL	1000																					
C2	820	PIEKARZ	1000																					
C2	828	FUNSTEN	1000																					
C2	829	KISHIMOTO	1000																					
C2	788	BARNES	1000																					
C2	774	HUNGERFORD	1000																					
C2	781	MAY/DEUTSCH	1000																					
C2	798	PENG/PILE	1000																					
C4	787	KYCIA	1000																					
C6	835	PIASETSKY/CHREN	1000																					
C8	811	ROBERTS	1000																					
D1	794	KRISCH	1000																					
D1	801	HODGES	1000																					
D1	819	HILL	1000																					
D1	825	LOVELAND	1000																					
D2	796	KOSSLER	1000																					
D6	777	ZELLER	1000																					
AGS MODES																								

AGS PROGRAM COMMITTEE	
MEETING DATE	PROPOSALS
APRIL 23	FEBRUARY 19

AGS MODES
 SEN - SLOWLY EXTRACTED BEAM
 FEB - FAST EXTRACTED BEAM
 SBE - SINGLE BUNCH EXTRACTION
 P.P. - POLARIZED PROTONS
 H.I. - HEAVY IONS
 S - SHUTDOWN
 ● - HEAVY ION COMMISSIONING

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S U M M A R I E S
O F
E X P E R I M E N T S

Experiment 745 - An Improved Test of QED - An Experiment to Measure
Vacuum Polarization in the 3d-3p Transitions in Muonic Helium

Brookhaven National M. May
Laboratory

CERN and E. Zavattini
Columbia University

Columbia University J. Derdarian, J. French, A.M. Sachs

Spokesman: A. Sachs

Present experiments test vacuum polarization effects in QED to an accuracy of 0.2 to 0.4%. This experiment is designed to make an order of magnitude improvement in these tests by a precise measurement of 3d-3p transitions in muonic helium, where the level separation is given almost entirely by the vacuum polarization terms.

The transition between high angular momentum states is selected to avoid the uncertainties in the r.m.s. charge radius of helium - an uncertainty which limits the accuracy of the 2s-2p experiments. However, since the lifetimes in the d and p states are 10^{-11} to 10^{-12} sec, the experimental technique involves inducing transitions with a CO_2 laser during the fast initial cascade and detecting the transitions by an increase in the emission of K_β x-rays.

In order to make a beam of stopping negative muons at the AGS, the design uses the SREL muon channel at 55 deg from the 28 GeV proton beam. The flexibility of the AGS accelerator permits the extraction of a short pulse of protons, producing an intense pulse of stopping muons, which is well matched to the laser pulse.

DOWNSTREAM
DETECTORS

Experiment 747 - A High Statistics Study of ϕ and $\phi\phi$ Production
from π^-p and K^-p Interactions at 22 GeV/c

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

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

City College of C.S. Chan, M.A. Kramer, J. Piekarz
New York

Spokesman: S.J. Lindenbaum

This experiment is a continuing search for glueballs in the Zweig suppressed reaction $\pi^-p \rightarrow \phi\phi n$. Three states have already been found: the $g_T(2050)$, $g_T(2300)$ and $g_T(2350)$, all with $I^{GJPC} = 0^+2^{++}$. If QCD is correct and the OZI rule is universal, these states must be produced by at least one glueball and probably three. The glueball resonance conclusion fits the unusual striking characteristics of this data [Etkin et al., Observation of Three 2^{++} Resonances in the Glueball-Enhanced Channel $\pi^-p \rightarrow \phi\phi n$. Phys. Lett. 165B, pp. 217-221 (1985)]. Alternative explanations have been shown to be incorrect and do not fit the data or both (S.J. Lindenbaum and R.S. Longacre, The Glueball Resonance and Alternative Explanations of the Reaction $\pi^-p \rightarrow \phi\phi n$. Phys. Lett. 165B, pp. 202-204 (1985); Lindenbaum, S.J. The Observation and Phenomenology of Glueballs. Invited Lecture. Superstrings, Supergravity and Unified Theories. The ICTP Series in Theoretical Physics, Vol. 2, pp. 548-593 (World Scientific Publishing Co., Singapore, 1986)].

E754

Experiment 754 - Determination of the Dynamics of Positive Muon
Motion in Aluminum

Bell Laboratories	A.T. Fiory, R.P. Minnich
Brookhaven National Laboratory	A.N. Goland, Y.C. Jean, K.G. Lynn
College of William and Mary	W.J. Kossler
George Mason University	W.F. Lankford
Virginia State University	C.E. Stronach

Spokesman: W.J. Kossler

The aim of this experiment is a detailed study of positive muon depolarization (μ^+ SR) in single crystal and polycrystalline samples of aluminum as a function of temperature and orientation in zero and applied transverse magnetic fields. The measurements are intended to discriminate between recent models of μ^+ motional behavior in metals: Anderson localization, quantum diffusion, classical diffusion, trapping/detrapping at impurities and in impurity-induced strain fields. The aluminum will be doped with various concentrations of Ag, Cu, Ga, In, Mg, Si and Zn impurities, selected in order to vary such parameters as valence difference, solubility and lattice distortion. Classification of μ^+ dynamics as a function of sample state variables is essential to the future use of μ^+ SR in more complicated condensed matter systems.

The well-documented SREL muon channel at the AGS installed for QED Experiment #745 provides a unique opportunity for condensed matter research using muons during times when the slowly extracted proton beam is incident on the D-line production target. The SREL channel with a wedge magnet and possibly focussing elements tunable for 125 MeV/c muons created a high intensity, high duty factor μ^+ beam competitive with those found elsewhere in the world.

Initial beam studies will use scintillators and wire chambers common to high-energy physics experiments. Newly designed and relatively standard apparatus will be used for data taking.

Experiment 766 - Study of Ω^- Production, the $S = -3$ System;
Search for New Resonances; Development of a New Approach
to Data Acquisition and Analysis

Nevis Laboratory Columbia University	M. Church, E. Gottschalk, R. Hylton, B. Knapp, B. Stern, L. Wiencke
University of Massachusetts	E. Hartouni, D. Jensen, M. Kreisler, M. Rabin, J. Uribe
University of Mexico	C. Avilez, W. Correa, J. Escalona
Fermilab	D. Christian, G. Gutierrez, S. Holmes, J. Strait, A. Wehmann
Spokesmen:	C. Avilez, B. Knapp, M. Kreisler

Since its discovery in 1964 by a team of Brookhaven scientists, there has been surprisingly little learned about the Ω^- . In particular some of its quantum numbers, spin for example, have never been measured; almost nothing is known about its production mechanisms; and there have been almost no systematic studies of the $S = -3$ system.

A new approach to the problems of event selection, triggering, data acquisition, and analysis which exist in the high interaction rate, complex topology environment available at high energy proton machines such as the AGS is being developed. We believe we can solve these problems with a spectrometer utilizing modern electronics technology which will eventually be capable of efficiently reconstructing with full numerical precision more than 10^5 complex events per second. This will allow unprecedented event selectivity and sensitivity to rare phenomena.

In order to develop this technology a study of the Ω^- system is the first major physics goal. We hope to: (1) Develop the on-line hardware processing technology and (2) Amass a large enough sample of Ω^- events in np or pp interactions to be able to (a) determine the Ω^- spin, (b) measure the Ω^- production cross sections in a variety of completely specified exclusive final states, and (c) search for other $|S| = 3$ resonances.

In two very short SEB runs, 500 million high multiplicity np interactions and a similar number of pp interactions were recorded. This large data sample will be analyzed with the hardware processor which has been set-up in the Wide Angle Hall in the CBA complex. In August 1986, the spectrometer system was shipped to Fermilab where the investigation of the hadronic production of heavy quark states will continue.

E767 SETUP

E767

**Experiment 767 - Development of a Low Energy Antineutron Source
and Measurement of $\bar{n}p$ Annihilation Cross Sections Near $\bar{N}N$ Threshold**

Brookhaven National Laboratory	D.I. Lowenstein
University of Houston	M. Furic, E.V. Hungerford, B.W. Mayes, L.S. Pinsky L. Tang, Y. Xue
Pennsylvania State University	T. Armstrong, A. Hicks, R.A. Lewis, W. Lochstet, B.Y. Oh, G.A. Smith, J. Whitmore
Rice University	J. Kruk, G.S. Mutchler, W. von Witsch
Spokesman:	G.A. Smith

This experiment is concerned with the development of a low energy antineutron source and measurement of $\bar{n}p$ annihilation cross section near $\bar{N}N$ threshold. The construction of an antineutron beam permits the study of the $\bar{N}N$ interaction at very low energies where dE/dx limits the usefulness of $\bar{p}$ beams. Antineutrinos are produced by 500 MeV/c $\bar{p}$ in the charge exchange reaction $\bar{p}p \rightarrow \bar{n}n$. Annihilation (and total) cross sections have been measured in the range 100-500 MeV/c antineutron momentum with unprecedented resolution (100 KeV - 6.7 MeV $\bar{N}N$ mass) and sensitivity very close to threshold [see T. Armstrong *et al.*, Phys. Lett. **175B**, 383, 1986]. No narrow states are observed. A comparison of cross sections with predictions based on phenomenological potential models or microscopic quark models is in progress.

EXPT'L LAYOUT

PRIMARY TRIG.: $RAM \{ P_2, P_3, \bar{C}_1 - H_1 \} + \text{OTHERS}$

SECONDARY TRIG.: $n \rightarrow n+2 (\pi^-)$
 $n \geq 4 (k^- \& p)$

Experiment 771 - Study of E-meson Characteristics in π^-p , K^-p
and $\bar{p}p$ Interactions

Brookhaven National Laboratory	S.U. Chung, R.C. Fernow, H. Kirk, S.D. Protopopescu, D. Weygand, H.J. Willutzki
Florida State University	A. Boehnlein, D. Boehnlein, J.H. Goldman, V. Hagopian, D. Reeves
Indiana University	A. Dzierba, R. Crittenden, T. Marshall, S. Teige, D. Zieminska
Southeastern Massachusetts University	Z. Bar-Yam, J. Dowd, W. Kern, E. King, H. Rudnicka
Spokesman:	S.U. Chung

The $E(1420)$ was discovered over a decade ago; yet it has remained a relatively obscure resonance due mainly to relatively small production cross sections in the conventional channels. Information on its branching ratios into $K\bar{K}\pi$ and $\eta\pi\pi$ and even its spin-parity are so far contradictory. Recently, the E meson has taken on an added topical significance after its observation in the radiative J/ψ decay. The speculations are that there are two states in the E region, a conventional $q\bar{q}$ meson and a glueball which is a bound state of gluons.

The aim of Exp. 771 is to perform a definitive analysis of the E mesons as observed in π^- , K^- and $\bar{p}$ beams at 6 to 8 GeV/c. It is anticipated that the statistics of the E-meson events in these reactions will be one to two orders of magnitude better than any that have hitherto been available. The experiment is performed at the MPS with a fast-forward K^+ trigger augmented by a multiplicity requirement near the LH_2 target.

The Hypernuclear Spectrometer and Liquid Deuterium Target with Range Hodoscope.

Experiment 773 - Search for $S=-1$ Dibaryon States in the Λp Missing
Mass Spectrum Near the ΣN Threshold in the Reaction $d(K^-\pi^-)\Lambda p$

Brandeis University	L. Bensinger, L. Kirsch, H. Piekarz
Brookhaven National Laboratory	S. Bart, R.E. Chrien, P.H. Pile, R.J. Sutter
Indiana University	T. Ward
Massachusetts Institute of Technology	M. Deutsch, J. Piekarz
Osaka University	T. Fukuda, T. Shibata
University of Houston	E.V. Hungerford, T. Kishimoto, B. Mayes, L.S. Pinsky
University of Texas	M. Barlett, G.W. Hoffman
Vassar College	R.L. Stearns

Spokesmen: H. Piekarz

This experiment proposes to search for strange dibaryon resonances in the Λp missing mass region above the ΣN threshold. In this region previous experiments have detected a threshold cusp due to the opening of the ΣN channel. But at higher momentum transfers a broader structure appears underlining the cusp which may be a predicted $S=-1$ dibaryon resonance. It is proposed to enhance this shoulder relative to the cusp by using a range hodoscope to reject spectator nucleons and events proceeding through the ΣN channel and by choosing the appropriate momentum transfer to enhance the reaction. A study of the relative magnitudes of the cusp and shoulder with respect to momentum transfer will be made to determine the orbital angular momentum of this enhancement.

PROPOSAL K π SPECTROMETER (I)
14 APRIL 82 P.Pile (X3913)

E774

Experiment 774 - Search for Σ -Hypernuclear Levels in ${}^4\text{He}$

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. Bassaleck
Vassar College	R. Stearns
Spokesman:	E.V. Hungerford

The experiment has observed narrow Σ hypernuclear structure in the (K^- , π^+) reaction using ${}^{12}\text{C}$ and ${}^7\text{Li}$ targets at incident momentum of 715 MeV/c. The object of the experiment is to obtain the Σ -nucleus spin orbit parameter. The structure in the ${}^{12}\text{Be}$ is consistent with structure seen earlier in the KEK data. The structure in the ${}^7\Sigma$ data are consistent with the predicted spectrum, however further analysis is needed to extract the interaction parameters.

The experiment will also attempt to observe a state in the Σ hypernuclear system ($\text{NNp}\Sigma^-$) for all particles in the 1s shell.

The selectivity model predicts one narrow state to be populated in this reaction if the level is bound or nearly bound. This state may also be narrow if it lies high in the continuum through a correction to the $\Lambda\text{N} \rightarrow \Sigma\text{N}$ conversion channel as postulated by Gal, *et al.* It is important to test these conclusions in one of the lightest possible systems.

Experiment 776 - ν -Oscillation Experiment at BNL

Columbia University	C.Y. Chi, N. Kondakis, W. Lee, B. Rubin, R. Seto, C. Stoughton, G. Tzanakos
University of Illinois	E. O'Brien, T. O'Halloran, K. Reardon
Johns Hopkins University	B. Blumenfeld, C. Chien, L. Duncan, E. Lincke, L. Lueking, L. Madansky, A. Pevsner
Spokesman:	W. Lee

This experiment is designed to search for $\nu_\mu \rightarrow \nu_e$ neutrino oscillation. The sensitivity limits are $\Delta m^2 = .03 \text{ eV}^2$ at full mixing, and $\sin^2 2\alpha = 10^{-3}$ at large Δm^2 . The 240 ton detector is a finely segmented EM calorimeter using drift tubes and concrete (90 planes) interspersed with scintillators (10 planes), followed by a toroidal magnetic spectrometer.

The detector is located 1 km from the neutrino source. A newly designed, two-horn dichromatic neutrino beam is used at $E_\nu = 1.3 \text{ GeV}$ for pion neutrinos and $E_\nu = 3 \text{ GeV}$ for kaon neutrinos.

This experiment has run during the winter 1984, Summer and Fall 1985.

EXP. # 777

Experiment 777 - Search for the Rare Decay Mode $K^+ \rightarrow \pi^+ \mu^+ e^-$

Brookhaven National Laboratory	T. Erickson, H.A. Gordon, D.M. Lazarus, P. Rehak, M. Tannenbaum
Yale University	C. Campagnari, P.S. Cooper, N. Hadley, W.D. Herold, A. Lee, M. Zeller
University of Washington	V. Chaloupka, H.J. Lubatti, E. Jagel
Schweizerisches Institut für Kernforschung	J. Egger, W.D. Herold, H. Kasper
Spokesman:	M. E. Zeller

This is a proposal to measure the branching ratio of the decay $K^+ \rightarrow \pi^+ \mu^+ e^-$ with a statistical sensitivity of 5×10^{-12} and systematic sensitivity of better than 10^{-11} . The apparatus involves a high flux, unseparated K^+ beam with momentum 6 GeV/c and a spectrometer which measures the momentum and species of all of the final state particles. The beam design is based on an existing beam modified to reduce the number of ambient muons passing through the detector. In addition to high kaon fluxes, 2×10^7 /machine pulse, features of the experiment that make such sensitivity possible are the low probability of a negatively charged electron and a muon from a K^+ decay, i.e. a good trigger signature, and the ability for good particle identification at low energies. The apparatus is thus designed around good electron identification employing atmospheric pressure Cerenkov counters and a lead scintillator shower detector.

In addition to $K^+ \rightarrow \pi^+ \mu^+ e^-$, the experimenters will collect several hundred times the present data sample for the reaction $K^+ \rightarrow \pi^+ e^+ e^-$. This will enable them to study the Dalitz plot distribution for this decay and look for possible $e^+ e^-$ state in the mass range $140 < M_{ee} < 340$ MeV.

Experiment 778 - Study of Nuclear Fragments Produced from
P-Nucleus Collisions in the Threshold Region $1 < p < 28$ GeV/c
Using a Warm Gas Jet Internal Target

Purdue
University

A. Bujak, D.C. Carmony, L.J. Gutay, A.S. Hirsch,
G. Paderewski, N.T. Porile, C. Sangster,
R.P. Scharenberg, B.C. Stringfellow

Spokesman: R.P. Scharenberg

The primary objective of this experiment is to study the production of heavy nuclear fragments by protons incident on nuclear targets in the threshold region of $1 < p < 28$ GeV/c. The novel features of this experiment are:

1. Fragment identification over a wide range of fragment mass and charge: $4 \leq A_f \leq 33$, $2 \leq Z_f \leq 13$. On the basis of a recently completed experiment, there is strong experimental evidence that these fragments are a manifestation of a system undergoing a phase transition.
2. An acceptance for a wide range of fragment kinetic energies which permits: (a) measurement below the peak in the kinetic energy distribution (~ 1 MeV/nucleon), (b) measurement well above the peak, enabling a determination of the kinetic energy slope parameter.
3. A determination of the fragment yields $Y(Z_f, A_f)$ as a function of beam energy. Since there is a paucity of fragment data in the threshold region, it is proposed to make a systematic study with a single apparatus, thereby avoiding normalization problems which exist in the literature.
4. The use of a 2 ng/cm^2 gas jet target located in the main ring beam line.

$\sim 22''$ GAP ; $\Delta p \sim 220 \text{ MeV/c}$

Status: In Progress

Experiment 780 - A Search for the Flavor Changing Neutral Currents $K_L^0 \rightarrow \mu + e$ and $K_L^0 \rightarrow e^+e^-$

Brookhaven
National
Laboratory

E. Jastrzembski, R.C. Larsen, L.B. Leipuner,
W.M. Morse

Yale
University

R.K. Adair, H. Greenlee, H. Kasha, E. Mannelli,
M. Mannelli, S.F. Schaffner, M.P. Schmidt, C.B. Schwarz

Spokesmen:

Scientific - M.P. Schmidt/W.M. Morse

This experiment is to be conducted in the A-3 external proton beam using a flux of about 10^{12} protons per pulse at $E_p \approx 30$ GeV.

The basic detector will consist of sets of mini-drift chambers placed about a 72D18 magnet to form a spectrometer, an atmospheric pressure hydrogen Cerenkov Counter, a large lead glass array, and iron/scintillator range stack.

The experimenters intend to search for the transitions $K_L^0 \rightarrow \mu e$ and $K_L^0 \rightarrow e^+e^-$ with a sensitivity to branching ratios larger than 10^{-10} . These flavor changing neutral currents are highly suppressed in the Standard Model, and the observation of these decays would imply the existence of new interactions.

The hypernuclear spectrometer at Brookhaven. Quadrupole magnets Q1-Q6, dipole magnets D1 and D2. Multiwire proportional chambers P1-P6, scintillation counters S0-S2, Cerenkov counters CK and CP, scintillation counter hodoscope H. The target is surrounded by intrinsic germanium detectors Ge.

Status: Completed in 1984
Extended for test

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

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

Massachusetts M. Deutsch
Institute of
Technology

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

Carnegie-Mellon P. Barnes
University

Vassar College R.L. Stearns

New York B. Budick
University

Spokesmen: M. Deutsch, M. May

This is a proposal to measure the γ -ray transitions between hypernuclear states which differ only by the orientation of the lambda 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.

E782

0 1 2m

Status: In progress

Experiment 782 - Spin-Spin Effects in Medium and High $P_{\perp}^2$ Elastic
p-p Scattering

University of Michigan	R.J. Bruni, P.R. Cameron, G.R. Court, D.G. Crabb, R. Cummings, I. Gialas, F.Z. Khiari, A.D. Krisch, A.M.T. Lin, R.R. Raylman, R.S. Raymond, T. Roser, K.M. Terwilliger
Brookhaven National Laboratory	K.A. Brown, G.T. Danby, Y.Y. Lee, L.G. Ratner
University of Maryland	D.C. Peaslee
University of Notre Dame	J.R. O'Fallon
Rice University	J.B. Roberts
Texas A&M University	T.S. Bhatia, G. Glass, L.C. Northcliff
ETH, Zurich	M. Simonius
Spokesman:	A.D. Krisch

This experiment will utilize the new unique AGS polarized proton beam capability and our polarized proton target to measure spin-spin effects in proton-proton elastic scattering. We will measure the elastic differential cross sections in pure initial spin states in a completely unexplored energy and momentum transfer region. The physics motivation is both the excitement of studying a totally unexplored area, and the further study of the large and dramatic high- $P_{\perp}^2$ spin-spin effect discovered at the ZGS. The ratio of the spin parallel to antiparallel p-p elastic cross section reached $\sigma_{++}:\sigma_{--} = 4$ at the maximum ZGS $P_{\perp}^2$ of 5.6 (GeV/c)^2 at 12.75 GeV/c. The ratio will be observed to see if it will continue to rise, to plateau, or to drop off as predicted by QCD quark interchange models. The unexpected ZGS results suggest that this proposed experiment should be very exciting.

$$\Delta\theta = \pm 25^\circ$$

$$0^\circ \leq \Delta\phi \leq 10^\circ$$

EXPERIMENTAL LAYOUT

Experiment 785 - Single Spin Asymmetry Measurement in Inclusive
p+p Reactions at 24 GeV/c at High $P_{\perp}$

Brookhaven
National
Laboratory

D.S. Barton, G. Bunce, A. Carroll, Y. Makdisi

University
of Minnesota

H. Courant, K. Heller, S. Heppelman, M. Marshak,
S.Z. Saroff, M. Shupe

Southeastern
Massachusetts
University

J.J. Russell

Spokesmen:

Y. Makdisi, M. Shupe

This experiment proposes to utilize the upcoming AGS capability to accelerate and extract polarized proton beams to measure single spin asymmetries (A_n) of inclusively produced pions, kaons, protons, antiprotons and lambda hyperons through the reactions:

$$p \uparrow + p \rightarrow \pi^{\pm} X$$

$$K^+ X$$

$$p X$$

$$\Lambda X$$

The existing single arm spectrometer of Experiment 755 situated in the zero degree beam line C1 will be used. The above reactions will be studied up to 90° in the center of mass system, thus at high $P_{\perp}$ and low Feynman x .

E. GARDNER
10-11-66E-787
DETECTOR

Under construction
Status: Tests in 1987
To run in 1988

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

Brookhaven National Laboratory	M.S. Atiya, I-H. Chiang, J.S. Frank, J.S. Haggerty, M.M. Ito, T.F. Kycia, K.K. Li, L.S. Littenberg, C.I. Petridou, R.C. Strand, C.L. Woody
Princeton University	W.C. Louis, D. Marlow, P. Meyers, F.C. Shoemaker, A.J.S. Smith
TRIUMPF	S. Ahmad, G. Azuelos, E. Blackmore, D. Bryman, J. Cresswell, P. Kitching, J.A. Macdonald, T. Numao, J.-M. Poutissou
Spokesman:	T.F. Kycia

This experiment proposes to search for $K^+ \rightarrow \pi^+ X^0 \bar{X}^0$ where X^0 is any neutral, light and weakly interacting particle with a sensitivity of 2×10^{-10} , three orders of magnitude better than the present limit.

The decay $K^+ \rightarrow \pi^+ \nu \bar{\nu}$ provides a sensitive test of the standard model of weak and electromagnetic interactions, a way of searching for new generations of quarks and leptons and a measure of the mixing angles in the present six quark models.

The decay $K^+ \rightarrow \pi^+ X^0 \bar{X}^0$ is also an excellent place to search for evidence of the variety of neutral, light and weakly interacting particles such as axions, familons, and the supersymmetric photino, goldstino, and scalar higgs (shiggs) predicted by current theories.

Will Measure Γ^p , Γ^n , Γ^π to $\approx 14\%$,

τ to $\approx 10\%$,

$E(p)$ to $\approx 15\%$,

$E(n)$ to $\approx 10\% - 20\%$.

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

Carnegie-Mellon University	P. Barnes, G. Diebold, G. Franklin, R. Grace, D. Hertzog, C. Maher, R. McCrody, B. Quinn, J. Seydoux, J. Szymanski, X. Yi
Brookhaven National Laboratory	R. Chrien, S. Bart, P. Pile, R. Sutter
University of Houston	E.V. Hungerford, T. Kishimoto, L.G. Tang
University of New Mexico	B. Bassalleck
Vassar College	R. Stearns
Spokesmen:	P.D. Barnes, G. Franklin

This experiment proposes to study 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 ${}^5_{\Lambda}\text{He}$, it is proposed to determine the life time 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, will be used to tag the formation of ${}^4_{\Lambda}\text{He}$ and ${}^5_{\Lambda}\text{He}$. The Carnegie-Mellon range and timing spectrometer will be used to measure the time spectrum and energy distribution of pion and proton decay products from the tagged events. Coincident neutrons will be detected in a time of flight neutron spectrometer. Previous data of this type is either non-existent or of very poor quality. The life time measurement will be based on the coincident proton spectrum with a system that has been demonstrated to be capable of $\sigma \approx 100$ ps prompt time resolution.

Experiment 789 - Search for $\xi(2.22)$ Formation
in $\bar{p}p$ Interactions

New York University J.H. Christenson, E. Hummel, G. Kreiter,
P. Nemethy, J. Sculli, Ming Zuo

Brookhaven National P. Yamin
Laboratory

Spokesman: J. Sculli

This experiment proposes to measure the cross section for $\bar{p}p \rightarrow K^+K^-$ in the region of the $\xi(2.22)$. If the peak cross section for $\sigma(\bar{p}p \rightarrow \xi \rightarrow K^+K^-)$ exceeds one microbarn, it is expected to observe the state and measure the width.

E791

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

Experiment 791 - A Study of Very Rare K_L Decays

University of California, Los Angeles	R.D. Cousins, J. Konigsberg, P. Melese, P. Rubin, W.E. Slater
Los Alamos National Laboratory	J.S. Frank, W.W. Kinnison, D.M. Lee, R.J. McKee, C. Milner, G.H. Sanders, H. Ziock
University of Pennsylvania	K. Arisaka, P. Knibbe, W.R. Molzon, J. Urheim, W.D. Wales
Stanford University	S. Axelrod, G.M. Irwin, K. Lang, J. Margulies, C.J. Martoff, D. Ouimette, J.L. Ritchie, Q. Trang S.G. Wojcicki
Temple University	L.B. Auerbach, P. Buchholz, V.L. Highland, W.K. McFarlane, M. Sivertz
College of William and Mary	M. Chapman, M. Eckhause, J. Ginkel, P. Guss, D. Joyce, J.R. Kane, C. Kenney, W.F. Vulcan, R.E. Welsch, R.J. Whyley, R.G. Winter
CoSpokesmen:	R.D. Cousins, W.R. Molzon

This experiment investigates rare K_L decays. The first priority is a search for the decay $K_L \rightarrow \mu e$ with a branching ratio sensitivity of 10^{-12} . A positive signal would be the first demonstration of the nonconservation of separate lepton number. The experimenters can also collect 10^3 - 10^4 events from the decay $K_L \rightarrow \mu^+ \mu^-$. With such a sample the longitudinal polarizations of the positive muons can be measured with a precision of 10-20%. A nonzero value is indicative of a new CP violating interaction. There is presently no experimental information on the muon polarization in this decay. The experiment will search for the decay $K_L \rightarrow e^+ e^-$. Since Standard Model predictions lie below the sensitivity of the experiment, a positive result would be another indication of new physics. The experiment also proposes to search for other rare decays: $K_L \rightarrow \pi^0 e^+ e^-$; $K_L \rightarrow \pi^0 \mu e$; $K_L \rightarrow \mu \mu \gamma$, $K_L \rightarrow e e \mu \mu$, etc.

Cross section through target and detector stack. Thicknesses of CR-39 and Pb sheets are 0.06 cm and 0.5 cm respectively.

Experiment 793 - Search for Fractionally Charged Nuclei in
15A GeV Sulfur - Oxygen Collisions

University of P.B. Price and M.H. Salamon
California - Berkley

Spokesman: P.B. Price

This experiment proposes to use a stack of CR-39 plastic track detectors to look for fractionally charged projectile fragments produced in collisions of 15A GeV sulfur nuclei with lead targets. The expected charge resolution is $\sigma_Z = 0.06e$ for fragments with $19 e/3 < Z < 47e/3$. Using similar equipment, an upper limit of $\sim 10^{-3}$ has been set on the fraction of projectile fragments with fractional charge in 2.1A GeV argon collisions with a plastic target at the LBL Bevalac. Theoretical considerations suggest that, if QCD is broken, quarks might become separated during a nucleus-nucleus collision and form quark-nucleus complexes if the CM energy is high enough. With its order-of-magnitude higher energy than the Bevalac, the Brookhaven heavy ion accelerator may permit this goal to be achieved.

Additional goals of the experiment are to measure the interaction mean free paths of projectile fragments, to look for forward-directed fragments with higher Z than the projectile, and to measure the dependence of detector response on Lorentz factor of the beam.

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, F.Z. Khiari, A.D. Krisch, A.M.T. Lin, R.S. Raymond, R.R. Raylman, T. Roser, K.M. Terwilliger
Brookhaven National Laboratory	K.A. Brown, G.T. Danby, L.G. Ratner
University of Maryland	D.C. Peaslee
University of Notre Dame	J.R. O'Fallon
Rice University	J.B. Roberts
Texas A&M University	T.S. Bhatia, G. Glass, L.C. Northcliffe
ETH, Zurich	M. Simonius
Spokesman:	A.D. Krisch

This experiment will scatter a high intensity unpolarized proton beam from a polarized proton target and measure the left-right asymmetry or 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 6.5 to 8 (GeV/c)² will be measured. The physics motivation is both the study of the totally unexplored area beyond $P_{\perp}^2 = 6.5$ (GeV/c)² and the improvement of the precision at 6.5 (GeV/c)² where recent AGS experiment E748 found a huge and unexpected value of A. The experiment will observe whether A continues to rise sharply in this previously unexplored hard-scattering region.

PROPOSED SLOW n DETECTOR

[PLAN VIEW]

- 1] OUTER DC: 151(h) x 107(v) x 15(d) cm
- 2] INNER DC: 151(h) x 56(v) x 15(d) cm
- 3] M COUNTERS: 122(h) x 15(v) x 0.6(d) cm
- 4] NEUTRON CTRS: 100(h) x 100(v) x 20(d) cm
- 5] TARGET: 50(l) x 40(w) cm (60L)

Experiment 795 - Measurement of the Imaginary Part of the $I=1$ $\bar{n}n$
S-Wave Scattering Length at Threshold

Brookhaven National Laboratory	D.I. Lowenstein
University of Houston	M. Furic, E. Hungerford, T. Kishimoto, B. Mayes, L. Pinsky, L. Tang, Y. Xue
Karlsruhe	S. Cierjacks, H. Poth
University of New Mexico	B. Bassalleck
Pennsylvania State University	T.A. Armstrong, R.A. Lewis, W. Lochstet, B.Y. Oh, S.M. Playfer, G.A. Smith, J. Whitmore
Rice University	J. Buchanan, J. Clement, J. Kruk, G. Mutchler, B. Moss, W. von Witsch
Spokesman:	G.A. Smith

This experiment proposes to measure $\beta\sigma_A$ (antineutron velocity*annihilation cross section) for antineutron-proton annihilation at energies extremely close to $\bar{n}n$ threshold. This quantity is proportional to the imaginary part of the $I=1$ $\bar{n}n$ S-wave scattering length. Such a measurement may reveal dramatic departures from the classical $\beta\sigma_A = \text{constant}$ dependence, which would be suggestive of the existence of bound $\bar{n}n$ states. The energy region in question ($T_n \lesssim 1$ MeV) has never been explored, and may be studied with practical upgrades to the existing E767 apparatus. The measurement would be complimentary to recently completed E767, which measured antineutron-proton annihilation cross sections at higher energies ($5 < T_n < 125$ MeV). Analysis of data is in progress.

E796

2 A3, A4, M5, F6, F7, F8

1

10 cm

Experiment 796 - μ SR Experiments on Hydrides,
Fluctuating Magnetic Fields in Solids and Knight Shifts

College of William and Mary	B. Hitti, J. Kempton, W.J. Kossler, Y. Li, H. Schone
Virginia State University	C.E. Stronach
George Mason University	W.F. Lankford
University of Warwick	E. Seymour
Brookhaven National Laboratory	A. Goland, K. Lynn, Y.J. Uemura
CEN-CNRS Grenoble	J.P. Boucher, J. Chappert, D. Fruchart, P. Vulliet, A. Yaouanc "
University of Uppsala	O. Hartmann, E. Karlsson, E. Wackelgaard, R. Wappling
Technische Universitat Munchen	L. Asch, M. Kalvius
Universite de Paris	J.P. Renard
Spokesman:	W.J. Kossler

This experiment uses the D4 stopping muon beam to carry out six μ SR experiments. The experiments are:

1. Muon sites and motion in non-magnetic hydrides.
2. Field fluctuations and magnetic hydrides.
3. A study of the one-dimensional antiferromagnetic $(\text{CH}_3)_4\text{NMnCl}_3$.
4. Strain induced muon precession frequency shifts in ferromagnets.
5. Magnetic fields in heavy fermion superconductors.
6. Giant Knight shifts in vacancies.

Experiment 798 - Study of Strangeness in Nuclei by Use
of the (π^+ , K^+) Reaction

Brookhaven National Laboratory	S. Bart, R.E. Chrien, P.H. Pile, R.J. Sutter
Carnegie-Mellon University	P.D. Barnes, G. Diebold, G.B. Franklin, D. Herzog, J. Seydoux, J. Szymanski
Florida State University	H. Plendl
University of Houston	E.V. Hungerford, T. Kishimoto
Los Alamos National Laboratory	J.F. Amann, T.S. Bhatia, J.A. McGill, E.C. Milner, J. C. Peng, R. Silbar, H.A. Thiessen
Rutgers University	C. Glashausser
University of Texas	M. Barlett, R. Fergerson, G.W. Hoffman
TRIUMF	D. Gill
Vassar College	R.L. Stearns
Spokesmen:	J.C. Peng, P.H. Pile

This experiment proposes to extend the (π^+ , K^+) measurements of E758 by searching for high-spin hypernuclear states in ^{16}O , ^{28}Si , and ^{40}Ca and by searching for dibaryon resonances in deuterium. Targets of ^{12}C and ^{16}O will be examined to establish confidence in the calculated quasi-free production. The experimenters intend to measure the ground state excitation in ^{28}Si and possibly ^{40}Ca and to look for highly-excited, deep-lying states in ^{12}C .

a. mercury tanks

E801

Expt. 801 - Layout

RWB
11-21-85

Experiment 801 - A Search for Quarks Produced
in Heavy Ion Mercury Interactions

San Francisco State University	R.W. Bland, C.L. Hodges, M. Savage, M. Lindgren, R. Johnson, S. Dickson
Lawrence Berkeley Laboratory	H. Mattis, H. Pugh
Fermilab	R. Tokarek
University of California (Irvine)	G. Shaw
Spokesman:	R.W. Bland

This experiment proposes to search for fractional charges produced in heavy-ion collisions at the BNL heavy-ion accelerator. Mercury will serve both as a production target and to stop reaction products. It will subsequently be distilled, then searched for quarks by a thoroughly proven automated Millikan technique.

The target will consist of a number of "tuna-can" shaped containers of mercury, arranged in the form of a long cylinder, with a radius of about 0.5 hadronic interaction lengths and with a length of 11 interaction lengths. It is designed to stop most hadronic secondaries produced in the heavy-ion collisions.

The mercury from the target will be distilled down to a 100-milligram residue with fractionally charged particles being retained in the residue by image-charge forces and an applied electric field. An estimated one milligram of the final residue can be searched for fractional charges using the stable-matter quark search apparatus at San Francisco State University. A sensitivity to one fractional charge per 10^{10} heavy-ion collisions is expected, an improvement of 10^4 over the current limit, set at an energy eight times lower.

In addition four liquid-nitrogen tanks will be placed in the beam. Fractionally charged particles stopping in these tanks will be collected on gold-plated glass fibers biased at ± 5000 V. After the exposure the gold will be dissolved in small mercury drops, which will be measured in the SFSU Millikan apparatus.

EXPERIMENT #802

Experiment 802 - Studies of Particle Production at Extreme Baryon
Densities in Nuclear Collisions at the AGS

Argonne National Laboratory	S. Kaufman, F. Videbaek
Brookhaven National Laboratory	A. Alburger, D. Beavis, P.D. Bond, C. Chasman, Y.Y. Chu, J.B. Cumming, R. Debye, E. Duek, O. Hansen, P. Hausteim, S. Katcoff, M.J. LeVine, Y. Miake, J. Olness, L.P. Rensberg, A. Shor, M. Tanaka, M.J. Tannenbaum, M. Torikoshi, J.H. van Dijk, P. Vincent, H. Wegner
Columbia University	S. Nagamiya, W. Zajc
Hiroshima University	T. Sugitate
Lawrence Berkeley Laboratory	H. Crawford, D. Greiner, P. Lindstrom
Massachusetts Institute of Technology	H.A. Enge, L. Grodzins, R.J. Ledoux, S.G. Steadman, G. Stephans, E. Vulgaris, D. Woodruff
University of Tokyo and INS	Y. Akiba, H. Hamagaki, S. Hayashi, S. Homma, Y. Ikeda
Waseda University	T. Doke, J. Kikuchi
Spokesmen:	O. Hansen, S. Nagamiya

An experiment using ^{32}S and ^{16}O beams from the Tandem-AGS accelerator at $T/A=14.6$ GeV/a.m.u. is proposed. Semi-inclusive spectra of $p^\pm$, $\pi^\pm$, $K^\pm$, d , α , and ϕ will be measured with a 25 msr single arm magnetic spectrometer. The primary physics goal is to establish effective temperatures in the hard nucleus-nucleus collisions and to measure particle production cross sections. These quantities may indicate if phase transition to a quark-gluon plasma has taken place. Particle identification for p , π , and K will be provided up to 5 GeV/c. Neutral transverse energy-flow will be recorded using a segmented Pb-glass wall. The trigger arrangements, in addition to the Pb-glass, encompass a 5000 pad proportional tube arrangement for multiplicity, a 0° thin scintillator to veto events with high Z forward going projectile fragments, and a beam calorimeter. A 1 msr solid angle complex of three gas Cerenkov counters with TOF and tracking will be used in conjunction with the spectrometer to measure and identify 5 to 20 GeV/c secondaries. The experiment features an active target.

Charge distribution of projectile fragments measured with 1.7 cm of their points of interaction. 75 primary Ar nuclei were included for calibration.

Status: In progress

Experiment 804 - A Search for Fractional Charge with Heavy Ion Beams
at the Brookhaven AGS

Indiana University S.P. Ahlen

University of G. Tarle
Michigan

Spokesmen: S.P. Ahlen, G. Tarle

This experiment proposes to extend studies initiated at the Bevalac to search for fractional charge production in high energy nucleus-nucleus collisions with high precision track etch detectors. Although no candidates were observed in the Bevalac experiments, it is possible that the dramatic increase in energy available at the AGS would be sufficient to allow quark deconfinement for the first time.

E805

Experiment 805 - A Search for Galactic Axions

University of Rochester	S. DePanfilis, A.C. Melissinos, B. Moskowitz, J. Rogers, Y. Semertzidis, W. Wuensch
Fermilab	W.B. Fowler, F. Nezrick
Brookhaven National Laboratory	H. Halama, A. Prodel
Spokesman:	A.C. Melissinos and H. Halama

Evidence indicates that the axion must have a light mass ($m_a \approx 10^{-5} \text{eV}$), and it has been suggested that axions may form the dark matter in the galaxies. In spite of their weak coupling, axions can be detected through their electromagnetic conversion to a photon in the presence of a strong static field.

The detector consists of a copper microwave cavity located in a 6.6T superconducting solenoid with a 20 cm bore and 50 cm in length. The signal from a field probe in the cavity is amplified by a GaAs FET followed by two stages of mixing and detected by an FFT. The cavity is tuned by a movable sapphire rod which is inserted into the cavity under computer control.

Data taking began in August 1986 at a frequency of $\nu = 1.090 \text{ GHz}$ and it is planned to search the region up to $\nu = 6 \text{ GHz}$. A set of six cavities will be used over this range. The detector sensitivity corresponds to an effective noise temperature $T_N = 0.1^\circ \text{K}$. A search for continuum radiation that couples to the electromagnetic field in the same way as the axion is also being carried out.

There are future plans for the construction of a 17T coil and for extending the search to the range $6 < \nu < 20 \text{ GHz}$.

Automatic Track Measuring System

Experiment 806 - Nuclear Fragmentation in Heavy Ion Collisions
at 15 GeV/amu

University
of Siegen

C. Brechtmann, H. Drechsel, J. Dreute
W. Heinrich

Spokesman:

W. Heinrich

This experiment proposes to expose stacks of plastic nuclear track detectors at the Tandem-AGS Accelerator Complex to 15 GeV/amu ^{32}S beam. Nuclear fragmentation cross sections of beam nuclei and fragments with charges $Z > 6$ will be measured for collisions with different targets. The energy independence of the cross sections and the validity of the factorization of these cross sections into a target and a projectile-related part at high energies will be tested. The experiment is designed to detect unexpected large emission angles of the fragments. The anomalous interaction mean free path effect will also be investigated. A new technique of automatic readout for the plastic detectors will be used which will allow the measurement of large quantities of tracks in these passive detectors.

Experiment 808 - Interactions of 14.1 GeV/amu Nuclei from ^{16}O
to ^{197}Au in Light and Heavy Targets

Institute of
Nuclear Physics
Krakow, Poland

A. Jurak, R. Holynski, A. Olszewski, B. Wilczynski,
H. Wilczynski, W. Wolter

Louisiana State
University

L. Barbier, W.V. Jones, E. Pruet, J.P. Wefel,
B. Wosiek

University of
Minnesota

P.S. Freier, C.J. Waddington

Spokesman:

C.J. Waddington

This experiment proposes to use nuclear track emulsions for investigating interactions of ^{16}O , ^{32}S and, when available, ^{108}Ag and ^{197}Au nuclei in light (plastic) and heavy (emulsion and lead) targets. Emphasis will be placed on the analysis of central collisions by selecting events exceeding a given threshold of target excitation, as defined by the number of low energy fragments emitted from the target nucleus.

Measurements in the emulsions will include (1) the charges and emission angles of the projectile fragments, (2) the number and emission angles of the produced charged particles, (3) the number and angular distributions of heavily ionizing particles emitted from the emulsion target nuclei, and, for a subset of the events (4), the number and energy of electron pairs in restricted angular regions. The data will permit studies of (1) projectile fragmentation modes, including transverse momentum distributions and possible dependences on the topology of the interactions, (2) the pseudo-rapidity distributions (including structure, correlations, etc) of charged particles and the dependence of the multiplicity on the number of interacting nucleons, and (3) the possibility of enhanced production of direct photons/electrons in high density matter.

NPS FIELD 5.0 ANGLE 0.000

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, T.W. Morris, E.D. Platner, A.C. Saulys
City College of New York and BNL	S.J. Lindenbaum
City College of New York	C. Chan, M.A. Kramer
Johns Hopkins University	P. Halman, L. Madansky
Lawrence Berkeley Laboratory	W. Geist, C. Gruhn, M. Heiden
Spokesmen:	S.J. Lindenbaum and E.D. Platner

This experiment proposes to study heavy ion collisions at the AGS by measuring the angles and momenta of virtually all charged particles emitted in each event. Particle identification will be determined where possible.

The experimenters will look for anomalous behavior in rapidities (or pseudo-rapidities), multiplicity, strangeness enhancements, $P_{\perp}(E_{\perp})$, energy flow; possibly observe Hanbury-Brown and Twiss effects, deflagration (detonations), 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 implying a QGP or other new states of matter, in a manner which tends to maximize signal-to-background ratios.

**Experiment 811 - Radiative Kaon Capture
and Hyperon Weak Radiative Decay**

Boston University	E.C. Booth, C. Heisey, K.P. Gall, E.K. McIntyre, J.P. Miller, B.L. Roberts, W. VanRiper, D. Whitehouse
University of Birmingham	J. Lowe, N. Hessay
University of British Columbia	M.D. Hasinoff, D.F. Measday, A. Noble
" Kozponti Fizikai Kutató Intézet	D. Horvath
TRIUMF	M. Salomon
Brookhaven National Laboratory	M. Sakitt, J. Skelly
Case Western Reserve University	W. Fickinger, D.K. Robinson
Spokesman:	B.L. Roberts

This experiment proposes to measure the branching ratios for $p(K^-, \gamma)\Lambda$ and $p(K^-, \gamma)\Sigma^0$ as well as the weak radiative decay $\Sigma^+ \rightarrow p + \gamma$ using stopped kaons from LESB II. These will be measured simultaneously using a large, high resolution NaI total absorption scintillation counter (TASC) to detect the photons. The weak radiative decay $\Lambda \rightarrow n + \gamma$ will be measured in the second half of the experiment. K^- will be stopped in LH_2 . The photon spectrum in coincidence with a K^- stop will contain the radiative capture photons. The radiative capture branching ratio for $Kp \rightarrow \Lambda\gamma$ is expected to be measured to a few percent. The observation of the $\Sigma^0\gamma$ final state is less certain as the branching ratio is completely unknown. We will have a sensitivity down to 7×10^{-5} . These two ratios will provide detailed information on the quark wavefunctions inside the Λ , Σ^0 , and the $\Lambda(1405)$. The weak radiative decay photons will appear in two tagged spectra. $\Lambda(\Sigma^+)$ production will be tagged by detecting the monoenergetic $\pi^0(\pi^-)$ associated with their production. The branching ratio for weak radiative decay (WRD) of the Σ^+ will check several controversial experiments. The branching ratio measurement for the WRD of the Λ will be the first measurement. We will also measure the branching ratio for $K^-d \rightarrow n\Lambda\gamma$ as well as to study the backgrounds present. This will be the first measurement of radiative capture in deuterium and will determine the feasibility of other experiments in deuterium. If the TASC has sufficiently good resolution, the spectrum in the endpoint region will provide information on the Λn scattering length.

Schematic of Apparatus

Experiment 813 - Search for a Strangeness -2 Dibaryon

Carnegie-Mellon University	P.D. Barnes, G. Diebold, G. Franklin, R. Grace, D. Hertzog, C. Maher, R. Rieder, J. Seydoux, J. Szymanski, B. Quinn
Brookhaven National Laboratory	S. Bart, R. Chrien, P. Pile, R. Sutter
Erlangen-Nurnberg University	W. Eyrich, A. Hofman
Freiburg University	J. Franz, N. Hamann, E. "Rossle, H. Schmitt
University of Houston	E. V. Hungerford
University of New Mexico	B. Bassalleck
University of Pittsburgh	S. Dytman
CEN, Saclay	P. Birien
Vassar College	R.L. Stearns
Spokesman:	G. Franklin, P.D. Barnes

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, $\Lambda\Lambda$, to 20 MeV above the $\Lambda\Lambda$ mass. The experiment is motivated by Jaffe's 1977 prediction of a six quark object with strangeness -2 and $J^\pi=0^+$ at a mass of 2150. This particle, called the "H", has been predicted by later bag models as well. Although the mass calculation is somewhat 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.

5615

Status: Under Construction
Test run in 1987

**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, R. Hogue, D. Lissauer, T. Ludlam, L. Olsen, V. Polychronakos, I. Stumer
CEBAF	V. Burkert
CERN	W.J. Willis
Los Alamos National Laboratory	J. Boissevain, N.J. DiGiacomo, A. Gavron, B.V. Jacak, P.L. McGaughey, W.E. Sondheim, J.W. Sunier, H. Van Hecke
Michigan State University	M. Maier
University of New Mexico	B. Bassalleck, J. Hall, N. Kominos, D. Wolfe
University of Pittsburgh	W. Cleland, J. Saladin, J. Thompson
State University of New York, Stony Brook	P. Braun-Munzinger, P. Paul, J. Stachel, L. Waters, T. Throwe
University of Tel Aviv	O. Benary, S. Dagan, Y. Oren
Yale University	B. Shivakumar
Spokesman:	P. Braun-Munzinger

This experiment proposes to study extreme peripheral collisions as well as more central collisions by combining 4π calorimeter coverage with a high resolution forward spectrometer. This will allow a completely exclusive study of the projectile fragmentation region and permit examination in detail of characteristics of more central collision events such as distributions of energy flow in conjunction with high resolution information on the leading baryons.

E815

Status: In progress

**Experiment 815 - Study of Particle Production and Nuclear Fragmentation
in Collisions of Heavy Ion Beams with Emulsion Nuclei**

University of Jaipur	K.B. Bhalla, V. Kumar, S. Lokanathan
University of Washington	T.H. Burnett, J.J. Lord, R.J. Wilkes
Lawrence Berkeley Laboratory	E. Friedlander, H.H. Heckman, Y. Karant
University of Marburg	E. Ganssauge
University of Lund	S. Garpman, N.-Y. Herrström, B. Jakobsson, I. Lund, B. Nrgren, I. Otterlund, S. Persson, E. Stenlund, K. Soderstrom
University of Ottawa	C.J.D. Hebert, J. Hebert
National Research Council, Canada	B. Judek
University of Jammu	N.K. Rao
Spokesmen:	I. Otterlund

This experiment proposes to measure, on an event-by-event basis, pseudo-rapidity density distributions, density fluctuations, multiplicity and angular distributions of nuclear fragments and recoiling protons (30-400 MeV) cross sections for production and interaction of light and medium ($Z = 2-8$) projectile fragments and the partial inelasticity for production of photons. The studies are performed in the energy range 13-200 A GeV. The detectors are emulsion chambers, as well as conventional emulsion stacks.

LAY OUT OF THE CALORIMETER TOP VIEW

Fiducial volume for μ interactions
 4×6

muon identification
 sci = Trigger hodoscopes
 x_i = Flash tube iron planes
 xy = Flash tube planes

Experiment 816 - Search for Neutrino Oscillations

Boston University	G. Bernardi, J. Stone
Brookhaven National Laboratory	M.J. Murtagh, D.H. White
CERN	C. Detraz, J.M. Perreau, M. Ferro-Luzzi
LPNHE Paris	P. Asrier, J. Chauveau, A. Diaczek, J. Dumarchez, F. Kovacs, A. Letessier, J.M. Levy, Y. Pons, A.M. Touchard, F. Vannucci
Spokesman:	F. Vannucci

This experiment proposes to repeat, with 20 times more statistics, an experiment done at CERN in the low energy PS neutrino beam. A possible excess of exclusive events with electrons gives a tantalizing indication of oscillations. The effect is based on about 20 events. Experiment 816 should have an order of magnitude more events.

EXPERIMENTAL LAYOUT for E-817

Experiment 817 - Polarization Transfer in Hyperon Production

Rice University	B.E. Bonner, J.A. Buchanan, J.M. Clement, M.D. Corcoran, N. Krishna, J.W. Kruk, H.E. Miettinen, G.S. Mutchler, F. Nessi, M. Nessi, G.C. Phillips, J.B. Roberts, P.M. Stevenson, S.R. Tonse
Brookhaven National Laboratory	A. Birman, S.U. Chung, R.C. Fernow, H. Kirk, S. Protopopescu
Johns Hopkins University	T. Hallman, L. Madansky
University of Houston	B.W. Mayes, L. Pinsky
Southeastern Massachusetts University	Z. Bar-Yam, J. Dowd, W. Kern, E. King
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. We are eager to measure the case of Σ^0 where the predicted effects are large ($D_{NN} \sim 2/3$, $A \sim .2$). This will provide a definitive test of these simple models as well as further information on the mysterious case of the inclusive hyperon polarization.

Status: To run in 1988

Experiment 818 - Search for a J^{PC} - Exotic Hybrid Meson

Brookhaven A. Birman, S.U. Chung, R.C. Fernow, H. Kirk,
National S.D. Protopopescu
Laboratory

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

Southeastern N. Bar-Yam, J. Dowd, W. Kern, E. King
Massachusetts
University

Rice University B.E. Bonner, J.B. Roberts, G.C. Phillips

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 $B(1235)\pi$.

Experiment 819 - Electromagnetic Dissociation of ^{59}Co , ^{89}Y , and ^{197}Au
by 15 GeV/Nucleon ^{16}O and ^{32}S

Iowa State
University

J.C. Hill, M.E. Nieland, J.A. Winger, F.K. Wohn

Spokesman:

J. C. Hill

This experiment will extend measurements of electromagnetic dissociation (ED) in target fragmentation carried out on ^{59}Co , ^{89}Y , and ^{197}Au targets at the Bevalac and AGS. The experimenters now propose to bombard Co, Y, and Au targets with beams of 15 GeV/nucleon ^{16}O and ^{32}S using the AGS heavy ion accelerator. For each target type three foils of successively greater thickness (ex. 50, 100, and 250 mg/cm^2 Au) will be irradiated simultaneously in order to correct for the contributions of secondary reactions which are significant for one-neutron out processes. The beam will be monitored using appropriate wire and ion chambers.

Hypernuclear Spectrometer, ^3He target and Range Hodoscope

Experiment 820 - Search for $S = -1$ Dibaryon Resonance (D_s)
in the Mass Region (2050-2130) MeV
Using the Reaction ${}^3\text{He}(\text{K}^-, \pi^+)n D_s$

Brandeis University	L. Bensinger, L. Kirsch, H. Piekarz
Brookhaven National Laboratory	S. Bart, R. E. Chrien, P. H. Pile, R. J. Sutter
Indiana University	T. Ward
Massachusetts Institute of Technology	M. Deutsch
Osaka University	T. Fukuda, T. Shibata
University of Houston	E. V. Hungerford, T. Kishimoto, B. Mayes, L. Pinsky
University of Texas	M. Barlett, G. W. Hoffman
Vassar College	R. L. Stearns
Spokesman:	H. Piekarz

The ${}^3\text{He}(\text{K}^-, \pi^+)n D_s$ reaction will be studied using the Hypernuclear Spectrometer in the LESB I beam line. As the D_s resonance is expected to be in p-state, the " $n D_s$ " missing mass spectra will be measured at scattering angle $\theta_{K\pi} = 21^\circ$, where previously D_t state has been observed.

AUS
EXPERIMENTAL ARRANGEMENT
NORTH EXPERIMENTAL AREA 1-10

Status: Stage I approval
(Funding pending)

Experiment 821 - A New Precision Measurement of the muon g-2 Value
at the Level of 0.35 PPM

Boston University	E. Hazen, C. Heisey, B. Kerosky, F. Krienen, D. Magaud, E.K. McIntyre, D. Magaud, J.P. Miller, B.L. Roberts, D. Stassinopoulos, L.R. Sulak, W. Worstell
Brookhaven National Laboratory	H.N. Brown, E.D. Courant, G.T. Danby, C.R. Gardner, J.W. Jackson, M. May, A. Prodell, R. Shutt, P.A. Thompson
City College of New York	J.A. Johnson, M.S. Lubell
Columbia University	A.M. Sachs
Cornell University	T. Kinoshita
University of Heidelberg	G. zu Putlitz
Los Alamos National Laboratory	W.P. Lysenko
University of Michigan	A. Rich
University of Mississippi	J.T. Reidy
Sheffield University	F. Combley
University of Tokyo	K. Nagamine, K. Nishiyama
National Laboratory for High Energy Physics (KEK)	K. Endo, S. Kurokawa
Riken	K. Ishida
Yale University	S.K. Dhanan, A.A. Disco, F.J.M. Farley, V.W. Hughes, Y. Kuang, H. Venkataramania
Spokesman:	V.W. Hughes

The measurement of the anomalous magnetic moment or g-2 value of the muon to a precision of 0.35 ppm which would represent an improvement by a factor of 20 over the famed CERN muon storage ring experiment, has been proposed. The general method will be the same as that of the latest CERN experiment, but with greatly improved statistics due to the high proton beam intensity of the AGS. Major improvements in the magnetic field uniformity and monitoring in the storage ring as well as improved decay electron detectors and data acquisition electronics will reduce the systematic errors. The primary aim of the AGS experiment is to measure the electroweak radiative correction to muon g-2 and thereby test the renormalizability of the standard theory. However, it will go beyond that goal and produce information on physics above 1 TeV by extending the search for lepton substructure and testing speculative new theories, such as supersymmetry.

Longitudinal velocity of representative Au target fragments as a function of the kinetic energy of the ^1H , ^{12}C , ^{20}Ne , ^{40}Ar projectiles.

Experimental setup for unusual projectile fragment study.

Status: To run in 1987

Experiment 825 - Radiochemical Studies of Ultrarelativistic
Nuclear Collisions

Oregon State University	W. Loveland, C. Casey, T.T. Sugihara
Lawrence Berkeley Laboratory	G.T. Seaborg, E.M. Friedlander
Brookhaven National Laboratory	P.E. Haustein, J.B. Cummings, S. Katcoff, Y.Y. Chu
Phillpps Universitat University of Oslo	R. Brandt, G. Dersch, G. Haase, P. Vater, R. Weiner E. Hagebo, P. Hoff
Purdue University	N.T. Porile, M. Bronikowski, Y.H. Chung
Studsvik Science Research Lab.	K. Aleklett, L. Sihver
Spokesman:	W. Loveland

This experiment proposes to extend previous studies of target fragmentation (measurements of which found unusual behavior of projectile fragments formed in the interactions of 1.8 A GeV ^{40}Ar with Cu), to ultrarelativistic nucleus-nucleus collisions by measuring the target fragment yields and recoil properties for the interaction of 15 A GeV ^{16}O and/or ^{32}S with Cu, Ag, La and Au. It will specifically ascertain whether the hypotheses of limiting fragmentation and factorization will continue to characterize target fragmentation as they have for nucleus-nucleus collisions induced by <2 A GeV projectiles.

Experiment 826 - Exclusive Experiment of High Energy Nuclear Reactions
Induced by ^{32}S Ions with 15 GeV/N at BNL AGS

Saga University	H. Itoh
Tohoku University	T. Hayasino, Y. Yamato, M. Chida
Nagoya University	K. Nakazawa
Osaka University	R. Ihara, T. Nakai
Sagami Institute of Technology	H. Sugimoto, K. Taira
Gifu University	S. Tasaka
Utsunomiya University	Y. Sato
Kanagawa University	N. Tateyama
Spokesman:	H. Itoh

This experiment proposes to study the nuclear interactions induced by ^{32}S ions with 15 A GeV accelerated at the AGS in order to reveal the new phenomena of nuclear matter (quark gluon plasma, hydrodynamical motion of multi-nucleon system, etc.) by exclusive analysis of high energy nuclear collisions.

$$\frac{d\sigma}{2\pi d\cos\theta_p dT_p} \left[\frac{\mu b}{\text{sr MeV}} \right]$$

Calculated cross sections for the reaction $\pi^+ + {}^{16}\text{O} \rightarrow p + X$. Shaded peak corresponds to the formation of the η -mesic nucleus ${}^{15}_{00}$. Solid curve represents the background events due to the $(\pi^+, \pi^0 p)$ process.

Status: Completed in 1987

Experiment 828 - Search for η -Mesic Nuclei with the (π^+, p) Reaction
at 0.85 GeV/c

Los Alamos National Laboratory	B.J. Dropesky, R.J. Estep, G.C. Giesler, L.C. Liu
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College of William and Mary	M. Finn, H. Funsten, C.F. Perdrisat
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Brookhaven National Laboratory	S. Bart, R.E. Chrien, P.H. Pile, R.J. Sutter, T.E. Ward
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George Mason University	B.J. Lieb
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Rutgers University	R.D. Ransome
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University of Houston	T. Kishimoto
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Vassar College	R.L. Stearns
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Virginia State University	C.E. Stronach
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Spokesmen:	L.C. Liu, H.O. Funsten, R.E. Chrien
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This experiment proposes to verify a recent theoretical prediction of the possible existence of strongly bound systems of the η -meson and nuclei: the η -mesic nuclei. This prediction is based on two facts: (1) recent analysis of threshold $\pi^- p \rightarrow \eta n$ production indicates that the η -nucleon interaction is attractive at low energies; and (2) because of quantum mechanical effects, a nucleus with sufficient size can cause this attraction to develop strongly bound states that cannot exist between an eta meson and a free nucleon.

Experiment 829 - Search for an $S = -1$ Three-Body Bound System

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

Brandeis H. Piekarz
University

Brookhaven S. Bart, R.E. Chrien, P.H. Pile, R.J. Sutter,
National T.E. Ward
Laboratory

Massachusetts M. Deutsch
Institute of
Technology

Osaka University T. Fukuda, T. Shibata

University M. Barlett, G.W. Hoffman
of Texas

Vassar College R.L. Stearns

Spokesman: T. Kishimoto

This experiment proposes to search for $pp\Lambda$ and $nn\Lambda$ bound systems by using the (K^-, π^+) reaction on a ${}^3\text{He}$ target. Experimentation has confirmed there is no bound state in the $S = -1$ two-body system. The lightest strange bound system experimentally known is ${}^3_\Lambda\text{He}$ which has very small binding energy. Preliminary considerations predict a slightly unbound $pp\Lambda$ or $nn\Lambda$ system; this cannot be taken as conclusive because of the large uncertainties of the three-body force. Experimental confirmation is desirable.

E831

Experiment 831 - Search for the Hypernuclear Projectile
Fragments in the Relativistic Heavy-Ion Collision
Using an Emulsion Chamber

University of C. Nagoshi, K. Omata
Tokyo, INS

Kobe University H. Fukshima, H. Fukushima, T. Hara, M. Miyagaki,
 K. Taruma, C. Yokoyama

Brookhaven D. Beavis
National Laboratory

Spokesman: Y. Shida

This experiment proposes to search for hypernuclear projectile fragments in the collision induced by 6 A*GeV/c and 14 A*GeV heavy ions. The production cross section of the hypernuclear fragment will provide information on the possibility of a secondary hyperbeam. If the ratio of the hyperfragments to normal ones ($= R$) is large, the lives and other properties of the hypernuclei can be studied. R is expected to increase more than an order of magnitude at 6 A*GeV/c due to increased hyperon production, and because of better kinematical matching in the formation probability of hyperfragments. In addition, secondary hyperon production processes such as the K , reaction should contribute to the production of the hypernuclear fragments. The beam energy will be varied to see if the yield saturates at higher incident energy.

Plan view of the Exp. 755 apparatus as modified for this proposal. Nuclear targets have been substituted for the liquid hydrogen target and the atmospheric Cerenkov counter C3 has been added. In actual running the spectrometer and side PWC's will probably be interchanged about the beam axis.

Experiment 834 - Study of Hadronic Hard Scattering Wave Functions
Using Elastic Scattering Inside Nuclei

Brookhaven
National
Laboratory

D.S. Barton, G.M. Bunce, A.S. Carroll, S. Gushue,
Y.I. Makdisi

University of
Minnesota

H. Courant, K.J. Heller, S. Heppelmann, M.L. Markshak,
E.A. Peterson, K. Ruddick, M.A. Shupe

Southeastern
Massachusetts
University

J.J. Russell

Spokesmen:

A.S. Carroll, S. Heppelmann

This experiment proposes to study short distance wave functions of hadrons for the case of large p_t exclusive scattering to determine whether the basis for many large p_t perturbative calculations using Quantum Chromodynamics (QCD) is correct. These calculations assume that at the moment of interaction (and for some time before and after) the hadrons consist only of valence quarks which occupy a very small region in space. During this time, the interaction of such hadrons are anomalously small.

Using the apparatus of Exps. 755, 785 and 790, elastic scattering of 9 GeV/c pions from protons inside nuclei will be measured. By observing the dependence on A of the nucleus, conclusions will be made whether the interaction of the incoming and outgoing hadrons is anomalously small or nearly the same as low p_t processes. In the former case the cross section will be proportional to Z and in the latter, it will grow very slowly with A . Such a small hadronic cross section would be a striking effect independent of the precise mechanism.

Status: Test in 1987
To run in 1987

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

Tel Aviv
University

J. Alster, D. Ashery, J. Lichtenstadt, M.A. Moinester,
I. Navon, E. Piasetzky, A. Rahav, I. Yavin

Brookhaven
National Laboratory

S. Bart, R.E. Chrien, M. May, P.H. Pile, R.J. Sutter

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.

Fig. 3. Experimental apparatus for ^3He target H particle search.

Status: Design
To run in 1990

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

Brookhaven National Laboratory	S. Bart, R. Chrien, P. Pile, R. Sutter
Carnegie-Mellon University	P.D. Barnes, G. Diebold, G. Franklin, R. McGrady, J. Seydoux, J. Szymanski, B. Quinn, X. Yi
Erlangen-Nurnberg University	W. Eyrich, A. Hofman
Freiburg University	J. Franz, N. Hamann, E. Rössle, H. Schmitt
Kyoto Sangyo University	F. Takeuchi
University of New Mexico	B. Bassileck
University of Pittsburgh	S. Dytman
CEN, Saclay	P. Birien
Vassar College	R.L. Stearns
Spokesman:	G. B. Franklin, P.D. Barnes

This experiment proposes to replace the two component target, used in the $(\Xi^-, d)_{\text{atom}}$ H search of Exp. 813, with a single ^3He target used in the reaction $K^- + ^3\text{He} \rightarrow K^+ + H + n$. 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.

Gluon
Exchange Quark
Interchange Annihilation/
Creation Quark Interch./
Annihilation

Plan view of the detector: BH and H1-H4 are scintillation-counter hodoscopes; PWC and DWC refer to proportional and drift wire chambers; and C1 and C2 are threshold gas Cherenkov counters for pions and kaons, respectively. The spectrometer magnet bent positive particles down and defined a narrow range of production angles about 22° in the laboratory. (28.4° for 6 GeV.)

Status: To run in 1987

Experiment 838 - 90° Exclusives at 6 GeV

Brookhaven D.S. Barton, G. Bunce, A.S. Carroll, Y.I. Makdisi
National Laboratory

University of H. Courant, K.J. Heller, S. Heppelmann, M.L. Marshak,
Minnesota M.A. Shupe

Southeastern J.J. Russell
Massachusetts
University

Spokesmen: G. Bunce, J.J. Russell

This experiment proposes to measure or set more stringent limits on the 13 exclusive reactions at 90° CM which were studied at 10 GeV, taking advantage of the higher cross sections at 6 GeV. A factor of 3 smaller momentum bite than was used at 10 GeV will be used, improving the missing mass resolution.

Publications of AGS Experiments 1982 - 1987

This is a new feature of the AGS Experiments book where the listings will cover experiments appearing in the previous 3-year sequence; on-going experiments (or those which have yet to take data) have the notation "running". Only refereed journal reports are listed here or, when only conference reports have been found, one conference report is listed. This was prepared using the SLAC database SPIRES. Authors were not always consulted this time, although we expect to hear from them in the future. 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.

Please note that this listing does not include publications (even recent ones) of older AGS experiments which were not left on the books in 1984.

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734	L.A. Ahrens, et al. (BNL/Brown/Hiroshima/KEK/Osaka/Penn/Stony Brook), Phys. Rev. <u>D35</u> , 785 (1987), "Measurement of neutrino-proton and anti-neutrino-proton elastic scattering".
	L.A. Ahrens, et al. Nucl. Instr. Meth. <u>A254</u> , 515 (1987), "A massive fine-grained detector for the elastic reactions induced by neutrinos in the GeV energy region".
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	L.A. Ahrens, et al. Phys. Rev. <u>D31</u> , 2732 (1985), "New limit on the strength of mixing between ν_μ and ν_e ".
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