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Subject INTERIM REPORT BY SUMMER STUDY GROUP
 ON CHARGED PARTICLE BEAMS

Members: A. L. Read, R. Stiening, W. T. Toner, D. H. White,
T. G. Walker

Written Reports:

1. General Ideas about Beam Design for NAL by W. T. Toner.
2. Secondary Particle Yields at 200 GeV by T. G. Walker.
3. A Proposal for the Use of the 10 BeV Booster Accelerator
as a Source of Low-Energy K^\pm Mesons by R. Stiening.
4. A Proposal to Use Synchrotron Magnets in Secondary Beams
by R. Stiening.
5. A Proposal for a Unilateral Target Station Number 1 by
D. H. White (in B7 file).
6. Elastic Hadron Scattering at 100 GeV/c by T. G. Walker
(in C1 file).
7. Backward π -p Scattering by D. H. White (in C1 file).

Beam Requirements: (Incomplete 7/12/68)

A summary was made of experiments proposed in UCRL-16830,
CERN/ECFA and NAL Summer Studies. (The latter requires updating).
The experiments can be classified according to intensity and
momentum resolution.

- a) Experiments requiring low intensity ($\sim 10^6$ particles per pulse) and moderate momentum resolution ($\frac{\Delta p}{p} \stackrel{\pm}{=} 1\%$).
 - i) Total Cross-Sections
 - ii) Yields Experiment and Mass Search
 - iii) Coherent Interactions
 - iv) Σ decays
- b) High intensity ($\geq 10^6$ ppp) and moderate momentum resolution.
 $(\frac{\Delta p}{p} \stackrel{\pm}{=} 1\%)$
 - Λ -p scattering
 - Σ -p scattering
- c) Low intensity ($\leq 10^6$ ppp) and good momentum resolution
($\Delta p = 100$ MeV/c).
 - Small angle elastic scattering
- d) High intensity and good momentum resolution.
 - Backward π - p scattering
 - Large angle elastic scattering

Table 1. Summary of Beams for Experiments Proposed at NAL Summer Studies 1967, 1968.
NAL/ASPEN

Author -expt	Location	Particle MOM ^M	Protons On Intensity	Target	Separated	Beam $\frac{\Delta p}{p}$	Comments
WHITE Backward π -p	C 1-68	π^- 30-100GeV/c	$\geq 10^7$	10^{13}	No	0.1%	
WALKER Small Angle Elastic	C 1-68	p, π, k 30-100GeV/c	2×10^5	$< 10^{12}$	No	0.1%	
WALKER Int Angle Elastic	C 1-68	η	$\geq 10^7$	10^{13}	No	0.1%	
ROMANSWSKI n -p elastic	C 1-68-19	η -	2×10^9	10^{13}	-	-	
Σ^\pm -p	C 1-68	Σ 150GeV/c	10^6	10^{13}	No	1%	
Σ^\pm decoy	C 1-68	Σ 100	10^5	10^{13}	No	1%	

Table II. Summary of Beams for Experiments Proposed in CERN/ECFA Vol. I II
 CERN-ECFA

Author -Expt	Location	Particle	Intensity	Protons On Target	Separated	Beams Δp p	Acceptance $\mu s \nu$	Comments
WILSON Particle Prod	Vol I p 201	p 300GeV/c	-	10^{13}	Use EPB	(EPB) 2%	$=$ $3 \cdot 10^{-3}$ μs	$3 \cdot 10^6$ particles into a DISC $p=40-240$ $\theta = 0-125^\circ$
BRADAMANTE σ Total	Vol I p 213	$\pi, k \leq 300$ p	$10^6/p$	10^{12}	No	$\pm 3\%$	10	Uses DISC
RATTI Coherent inter- action	Vol I p 224	π, k <200	$10^6/p$	10^{12}	No	$\pm 3\%$	10	Spark Chambers in beam
CLEGG Photon beam	Vol I p 246	γ		10^{13}	Use EPB	10 GeV		Production angle, 0°
MANNING Elastic Scattering	Vol I p 253	π, k, p ≤ 240	$2 \cdot 10^5/p$	$<10^{12}$	No	1%	10	θ scatt <10 mrad 100 MeV/c spectro- meter spark chambers
LILLETHUN Quarks	Vol I p 271	$q < 400$ GeV/c	Uses	EPB 3×10^{12}	No	4%	4	Uses EPB 0°
KEMP Small-angle Scattering	Vol I p 280	π, k, p 40	$10^5/p$	10^{11}	No	1%	20	Counters 0°
BERNARD - RF Counter Beam etc also RF BC beams	In Vol II	100	10^6-10^7	10^{13}	Yes	0.1%	10	Several RF beams deserted
Exp Area	Vol I p 132							

Table III. Summary of beams for Experiments Proposed in UCRL-16830

Author -expt	Location	Particle	Intensity	Protons on Target	Separated?	Beam	$\frac{\Delta p}{p}$	Comments
JOVANOVIC Particle Prod	p 11 Vol III	p 200 BeV c	10^{12} /pulse	-	Use EPB	(EPB)		Small H ₂ target - could upstream of target station for secondary beams
COOK Hyperon Beam	p 133 Vol III	K ⁻ 50 BeV c	10^7 /second	Not specified	Yes	Not Specif.		
		H ⁻ 100 BeV c	5/pulse	10^7	No	$\pm 10\%$	Requires 50 kG bending magnets	
SELOVG Electron Beam	p 151 Vol III	± 100 e BeV c	2×10^6 /sec		No	$\pm 1\%$ $\Delta\Omega = 4 \times 10^{-6}$ SR	p on target $\rightarrow \pi^-$ converter $\rightarrow e^+ e^-$	
KADYK k beam	p 213 Vol III	K [±]	~ 12 /pulse (Be expts)	Modest #	Yes	Requires 0.26-mm-rad emittance		Beam is separated by counters and kicked into bubble chamber. It is very long ~3000'
LONGO (TOOHIG)	p 132 Vol I	π^- (unsepar- ated) 50-150 BeV/c	4×10^8 /sec at 50 BeV/c	5×10^{12} /sec	No	$\pm 1\% \frac{\Delta p}{p}$ 3×10^{-6} SR	(Diffraction scattering - Longo p.104, I) Experiment not Described (pion form factor - see Toohig, p 144 vol I)	
LONGO	p 108 Vol I	Λ^0 100 BeV/c	10^5 /sec	10^{13} /sec	No	$\pm 20\% \frac{\Delta p}{p}$	Requires 50 kG bending magnets	
LACH	p 190 Vol I	K [±] 100 BeV/c	6800/pulse K ⁻ 100 BeV c	10^{13} /sec	Yes	$\pm 0.25\%$ 4×10^{-6} SR	RF separated Beam Requires target 0.2 mm high	
READ πp charge exchange	p 256 Vol I	SEE BEAM BY LONGO						
READ	p 256 Vol I	Neutral						