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Emulsion Group/Internal/62/1

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Λ^0 Magnetic Moment Test Exposures

We have completed a run to test fully the Λ^0 magnetic moment measurement using emulsions in a pulsed coil with a transverse magnetic field.⁽¹⁾ The exposures were made in the k_1 beam which, after some modification, gave more than 10^5 π^- per burst into an area of about 2 cm^2 . Runs of 10^3 pulses with both signs of field were planned to give sufficient statistics within the probable lifetime of the two Lausanne coils. In the remaining time, exposures were made to test curvature measurement at low momentum, necessary for the Λ^0 experiment, and to test the feasibility of a measurement of the magnetic moment of the Σ^+ by a similar technique.

The following table summarises the exposures:

Coil	Lausanne I		Lausanne II		Oerlikon		CERN type IIIb	
	+	-	+	-	+	-	+	
Sign of Field	+	-	+	-	+	-	+	
Field Strength (KG)	75	110	75	75	50	100	180	0
Number of pulses	511	99*	1003	1003	2	1	300	254
Beam	1.05 GeV/c π^-				1.15 GeV/c positive			
Angle between beam and coil axis	18°				0°		9°	
Aim of exposure	Λ^0 Magnetic Moment (≤ 18 cms path at maximum field)				Curvature at Low Momentum		Background test for Σ^+ Magnetic Moment	

* Coil Failure

The exposures and coil changes occupied 15 hours. 22 hours were used to set up the π^- beam, and 1 hour for the positive beam. One pulse in five was used for 95% of the time.

Beam characteristics which may be of interest to future users of the beam are summarised below.

Momentum of Circulating Beam: 19.2 GeV/c

Target: 5 x 5 mm Be, point source.

Burst: ~ 2msec. [A 50 to 100msec burst was used for counter flux measurements, which were in agreement with emulsion test plate observations.]

beam	π^-	Positive*
p	1.05 GeV/c	1.15 GeV/c
$\Delta p/p$	$(2.7 \pm 0.5)\%$	$(2.7 \pm 1)\%$
$\Delta \Omega$	$(3 \pm 0.5) \times 10^{-4}$ Sterad	$(3 \pm 1) \times 10^{-4}$ Sterad
Flux/ 10^{11} protons	$9.3 \times 10^4 \pm 15\%$	$6 \times 10^4 \pm 15\%$
Beam at Focal Point (33.3m) (Full width at half intensity).	Height: 15 ± 2 mm Width: 10 ± 0.5 mm	25 ± 2 mm 25 ± 2 mm
Target radial position	07 Top: 21 mm outside	07 Top: 17.5 mm outside
Q_1	51.7 mV	57.65 mV
M_1	36.4 "	40.0 "
Q_2	46.6 "	52.1 "
Q_3	14.7 "	16.1 "
M_2	37.2 "	41.0 "
Q_4	9.8 "	10.73 "
Q_5	12.3 "	13.47 "

* Not Optimised

We would like to thank the many people who have made this run possible, in particular Dr. Hyams and Dr. Standley for their help with scheduling, and Dr. Filthuth for a pleasant collaboration in setting up the K_1 beam and for his agreement to the modification of the beam in the middle of the 30 cm HBC K^- run.

A scintillation camera kindly lent by Dr. Kalmus was very useful for optimisation of the beam.

We are grateful to the groups (von Dardel, Taylor, Fidecaro and Ramm) who were most co-operative co-users of the machine during the week. We would also like to thank Mr. Gervaise (PS Linkman), Mr. Richter and Mr. Merminod who provided us with very good target operation, and the PS. Crews who gave us a trouble-free run.

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and

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(1) 'Measurement of the magnetic moment of the Λ^0 hyperon'

Experiment Ell (October 9, 1961)

Proposal to NPRC 2/11/61

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