

9 April, 1962

Memorandum

To : The members of the Nuclear Physics Research Committee  
From : P. Preiswerk  
Concerning : The programme for counter experiments, to be discussed at  
the NPRC meeting of 11 April, 1962

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The Electronic Experiments Committee met on 29 March 1962 and 5 April 1962, mainly to discuss the programme for PS counter experiments in Period III (23-10-1962 to 15-2-1963).

A. Developments in the counter experimental programme for Period I

A review of the status of the PS counter experiments in Period I is given in Annex I, attached to this memorandum. According to a decision of the NPRC (14-3-1962), one additional week of machine time will be allocated to experiment D6, the measurement of the  $\pi^0$  life-time. This week is not available in Period I (see below, Period II).

A status report of SC counter experiments on 5 April 1962 is also attached.

B. Developments in the proposed PS counter experimental programme for Period II

The NPRC decisions on machine time allocation for Period II are summarized in Annex II.

There are no special remarks, except for the following developments:

Exp. D6  $\pi^0$  life-time

The additional week of machine time allocated to this experiment has to be scheduled in Period II. The construction of the high energy  $\pi$ -beam ( $d_9$ ) will thus be delayed by 6 - 8 weeks.

Exp. S2 Peripheral processes

A decision by the NPRC on the number of shifts to be allocated in Period II is still pending (NPRC 19-2-1962, page 3).

Exp. S5 Pion form factor

NPRC decision still pending. Machine time allocation depends on results of test run, which is now in progress.

Exp. S9 Test of special relativity

The apparatus for this experiment is still being studied and will not be ready in Period II. The group would like to do the experiment in Period III.

Exp. S15 Charge exchange scattering

A test run of 10 shifts is technically feasible. A decision by the NPRC on time allocation in Period II is still pending (NPRC, 19-2-1962, page 3).

C. Decisions taken by the Electronic Experiments Committee regarding the proposed PS counter experimental programme in Period III

It is assumed that out of a total of 13 weeks of PS machine time in Period III, not more than 3 weeks or 45 shifts will be available for counter experiments. Even when a maximum amount of parallel running is allowed for, only about 35 shifts will be available in each beam during Period III. To avoid a division of these shifts over too many experiments, only two experiments will be considered in each beam for this period.

To obtain the necessary continuity in the beam programme, the EEC recommends that the beams for counter experiments available in Period II,  $c_3$ ,  $d_0$ ,  $q_1$  and  $a_2$  will continue to exist in Period III. This does not lead to technical difficulties, except for an incompatibility of the newly proposed Track Chamber beam  $m_2$  with beam  $d_0$  or with any other high energy secondary beam in the South Area.

The PS offers a unique opportunity to perform experiments with particles of energies between 10 and 24 GeV/c and several counter experiments ( $S_1$ ,  $S_2$ ,  $S_5$ ,  $C_5$ ) have been proposed to investigate this virtually unknown energy region.

The existence of a 10 - 20 GeV/c secondary beam for an indefinite period is therefore felt to be an essential condition for the planning of an optimum programme for counter experiments at PS.

The East Area work on the muon beam for experiment S14 should be started as soon as possible in Period III.

With these considerations in mind the EEC proposes for Period III the following very tentative programme.

<u>Beam</u>	<u>Experiment</u>		<u>Shifts</u>
d <sub>9</sub>	S <sub>1</sub>	π - p elastic scattering	35 a Parasiting on track chambers
	S <sub>5</sub>	Pion form factor	
	S <sub>9</sub>	Test of special relativity	
c <sub>3</sub>	C <sub>4</sub>	p - p inelastic scattering	35 b
a <sub>2</sub>	L <sub>2</sub>	Strange particle physics	35 a
	S <sub>11</sub>	p - p̄ annihilation to electron pair	
q <sub>1</sub>	To be used as a test beam		
o <sub>3</sub> (East area)	S <sub>14</sub>	Muon beam production	

The following proposed counter experiments are not included in this programme and would therefore certainly not get machine time allocated before 15 February 1963.

<u>Symbol</u>	<u>Name</u>	<u>Title</u>	<u>Beam required</u>
C <sub>5</sub>	Taylor	π - p diffraction scattering	12 GeV/c π <sup>-</sup> 10 <sup>6</sup> π/burst
S <sub>16</sub>	University College London	Proton polarization in π - p scattering	0.7 - 1.1 GeV/c π <sup>-</sup> 5 x 10 <sup>5</sup> π/burst
S <sub>17</sub>	Sens	Beta decay of the Λ	0.9 GeV π <sup>-</sup> 5 x 10 <sup>5</sup> π/burst

The neutrino experiment has been left out of consideration in this analysis, because it is not considered any more as a counter experiment proper.

Status of PS counter experiments on 7 April 1962

Symbol	Name	Title	Shifts already obtained	Total time allocation by NPRC in shifts for Period I
C <sub>3</sub>	Taylor	110 mr p-p scattering	24	24
S <sub>4,5</sub>	Backenstoss	Peripheral photon pro- duction	11	10
D <sub>6</sub>	von Dardel	$\pi^0$ life-time	24	15
L <sub>2</sub>	Lundby	Strange particle physics	30	30
S <sub>6</sub>	Fidecaro	$\Sigma - \Lambda$ parity	36	-
N <sub>3,5</sub>	Faissner	Neutrino experiment	2	17
S <sub>7</sub>	Roberts	$\Sigma - \Lambda$ parity	12	15

Remarks

- C<sub>3</sub> Measurements completed.  
Smallest  $\sigma_{lab}$  measured for 23 GeV was 0.5  $\mu\text{b}/\text{sr}$  for  $t = 5.4 (\text{GeV}/c)^2$   
( $\sigma_{cm} \sim 10^{-32} \text{ cm}^2/\text{sr}$  at  $45^\circ$ )
- S<sub>4,5</sub> Background measurements are under way.
- D<sub>6</sub> Preparing a new run.
- L<sub>2</sub> First part of the experiments is completed.
- S<sub>6</sub> 30000 pictures have been taken for the polarization measurement and these pictures are being analysed.
- N<sub>3,5</sub> Construction of 30 ton spark chamber is progressing. Experimental tests on sub-units.
- S<sub>7</sub> Making test runs.

Status of SC Electronics Experiments on 5 April 1962

- 1) Citron       $\mu$ -scattering by carbon      Evaluation of data will be finished in about 2 weeks
- 2) Rubbia       $\mu$ -capture in hydrogen      Analysis of 20000 pictures. Preliminary results available
- 3) Farley       $\mu$  life-time at rest      Preliminary run has revealed a systematic effect also present in previous experiments. A new run eliminating this effect is planned
- 4) Conversi       $\mu$ -radiative capture      Experiment carried out. Several events have been observed and are analysed
- 5) Heintze      Search for  $\pi^+ - \pi^0$  decay mode      Experiment is running properly. In one month running time the observation of 20 events is expected with the geometry used at present
- 6) Sens      Capture of  $\mu$  in  $O^{16}$       Equipment is in preparation
- 7) Dick       $e^+$  polarization      Experiment under way

Requested and allocated machine time for  
PS counter experiments in Period II

Beam	Symbol	Name	Title	Shifts requested	Shifts allocated by NPRC
c <sub>3</sub>	S <sub>8</sub>	Taylor	Deuteron production in p-p collisions	20	20
	N <sub>4</sub>	Taylor	$\pi$ - production at small angles	15	12+
d <sub>9</sub>	S <sub>2</sub>	Caldwell	Peripheral processes	30	20+ ?
	S <sub>5</sub>	Backenstoss	Pion form factor	15	?
	S <sub>14</sub>	Citron	$\mu$ -p scattering (tests)	10	10 p
a <sub>2</sub>	A <sub>2</sub>	Lundby	Setting up of beam a <sub>2</sub>	15	15
	S <sub>11</sub>	Conversi	$\bar{p}$ -p annihilation to elec- tron pair	30	10
	S <sub>7</sub>	Roberts	$\Sigma - \Lambda$ parity	30-40	25 p + 10
a <sub>1</sub>	S <sub>6</sub>	Cork	$\Sigma - \Lambda$ parity	50 p	30 p + 10
Neutral	S <sub>15</sub>	Wetherell	Charge exchange scattering	10 p	?