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M e m o r a n d u m

To : Prof. P. Preiswerk.
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 Subject : Machine time requirements for the S₁ and S₂ experiments.

It seems appropriate to specify more clearly the machine time requirements for the experiments S₁ (elastic π -p scattering) and S₂ (peripheral π and K processes) in the future high-energy π -meson beam (d9).

The machine requirements are given supposing good machining operation, and time for adjusting the beam itself is not included.

Elastic scattering (S₁)

	<u>π beam re- quired and obtainable</u>	<u>Machine energy and fraction of internal beam required</u>	<u>Machine time for 10⁴ good events</u>	<u>Machine repetition frequency</u>
1.	π^- 18 GeV 3 × 10 ⁴ /burst	26 GeV (1/2 - 1 × full beam)	100 hours	1 burst/5 sec
2.	π^- 12 GeV 3 × 10 ⁴ /burst	18 GeV (1/10 - 1 × full beam)*)	40 hours	1 burst/2 sec
3.	π^+ 12 GeV 10 ⁴ /burst (beam flux not certain)	18 GeV (full beam)	70 hours	1 burst/2 sec

Di boson experiments (S₂)

4.	π^- 18 GeV 3 × 10 ⁴ /burst	26 GeV (1/2 - 1 × full beam)	100 hours	1 burst/5 sec
5.	π^- 12 GeV 3 × 10 ⁴ /burst	18 GeV (1/10 - 1 × full beam)*)	40 hours †)	

Final tests of apparatus

6.	π^- 12 or 18 GeV	(as above)	80 hours total for all experiments together.	
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*) This means: full beam can be used, but down to 10% of beam is adequate.

†) for 5000 events.

This programme would require a total of 430 hours of PS machine time, or 72 shifts.

In case this amount of machine time cannot be allocated, the following possibilities constitute a minimum programme:

- either 1 alone and 4 alone;
or 2+3 alone and 4 alone.

For each of these two possibilities the requirements are 280 hours of PS machine time, or 47 shifts.

The information expected from each of these experiments can be summarized as follows:

1. Explores the largest momentum transfers available.
2. and 3. Test of the elementarity of the neutron.
4. Measurement of di boson spectra and test of peripheralism.
4. and 5. Measurement of energy dependence of peripheral interactions and therefore test of elementarity of pion.

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