EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

EmC 66/A
6.1.1966

MEMORANDUM

To : Emulsion Experiment Committee

From : Λ°-Magnetic-Moment Collaboration (E. Dahl-Jensen, A.J. Herz)

Re : Beam a_9 for Λ° experiment E 58

In this memorandum we set out our proposal for the a_9 beam. In it we have taken account of all the information we have been able to obtain concerning the physical limitations around the PS, and the availability of beam-transport-equipment and shielding materials. We have also taken into consideration the requirements of other experimental groups as far as we were able to obtain information about them.

The requirements we have taken into account are the following:

a) The 200-cm HBC must not be put out of action by a_9.
- We interpret this to mean that there should not be any interference with the choice of beams for the 200-cm chamber when a_9 is off, and that <u>at least</u> one of the beams for the chamber should be usable with <u>at least</u> 9 bursts out of 10 when a_9 is running (note that the Λ° experiment cannot take more than 1 burst out of 10; the average consumption of bursts during testing and running time - see EmC 65/8 - is expected to be less than 7.5 %)

b) The large-angle pp-scattering experiment of the Cocconi-Wetherell group should be interfered with as little as possible.

c) The need for shielding should be kept down.

d) Other things being equal, it is preferable to have a design such that the overhead cranes can be used for installation.

In what follows we describe first the arrangement we consider to have the best combination of characteristics; other possibilities are discussed further below.

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The proposed beam arrangement

1) Lay-out

We propose to use fast ejection 58 in the following way (see attached drawing) :

A deflection magnet type ME 150 (modified to allow it to be cycled) is installed down-stream from the existing hydrogen target (1 on drawing; 3 is the ME 150 magnet to be installed) of the large-angle scattering experiment. The target for the m_6 beam (2 on drawing) is placed into the undeflected proton beam line, as planned by TC at present. so that the m_6 beam can operate normally whenever the deflection magnet (3) is off.

The target for the a_9 beam (4 on the drawing) is placed on one side of the m_6 target, and the proton beam is deflected to it by turning on the magnet 3 for any burst in which a_9 is required to operate instead of m_6. As the ME 150 magnet (3) with rectifier power supply can be taken very rapidly through a complete off-on-off cycle (rise time 0.5 sec)it is possible with this arrangement to select single bursts for the a_9 target, whilst all other bursts go to m_6. There is, of course, no interference whatsoever with the protons for m_6, or m_6 itself, as long as the magnet (3) is off.

With this lay-out, the targets for m_6 and a_9 are close together so that they can share one shielding enclosure and one beam stopper. As far as economy of shielding material is concerned, this type of design ie superior to any in which the two targets are widely separated and have to be provided with separate shielding and separate beam stoppers (one oscillating, one fixed).

On the drawing, the a_9 target (4) and beam are shown placed between the m_6 and u_1 beam lines. This arrangement has the advantage that most installation work can be done within the range of the overhead crane. On the other hand, the beam-stopper and shielding design will be complicated, and there will be rather little space around the experimental equipment. The alternative is to place the a_9 target in position 5, between m_6 and the wall of the experiment hall, and to let the beam pass through the wall to the outside. In that case most installation work would have to be done with mobile equipment, and a hut would have to be erected outside to provide shielding and accomodation for the experiment.

It should be noted that the proposed lay-out is such that m_6 is not affected if a_9 is dismantled partially or completely.

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2) Interaction with other experiments

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Operation of a_9 is clearly compatible with that of m_6, both during setting up and running of the experiment, with m_6 always receiving at least 9 bursts in 10.

Like m_6 and the large-angle-scattering experiment, a_9 is incompatible with o_8 proper, but o_8 could still be operated from target 61 whilst a_9 (or any other beam requiring ejection 58) is running. The a_9 beam, as proposed here, cannot run at the same time as u_j.

Large-angle scattering

During setting-up of a_9 it is possible, or even preferable, to use long bursts. Setting-up can therefore be done when the large-angle-scattering experiment is running with slow ejection. During exposures, however, fast ejection is needed, so that the scattering experiment cannot run at those times.

We understand that the m_6 beam also can be set up with long bursts, but is incompatible with large-angle scattering during production runs.

Other experiments

As far as we know, Rubbia, Steinberger et al. are expected to move to slow ejection 62 (e_3) during the next shut-down, so that there will not be any interference with them.

Other Possibilities

1) Beam switching upstream of the u_1 target would, in principle, make a_9 compatible with u_1 and m_6. This possibility was investigated, but is was found that it would be extremely difficult to find space for the beam and the equipment in the area involved. In particular it appears that survey pillar 6 would have to be removed or modified.

2) If the large-angle pp-scattering experiment were to move to the e_3 beam, it would be possible to build a_9 from their present target position, with a flip-up target for a_9. In that case also there would have to be an oscillating beam stopper behind the a_9 target. Furthermore, the first bending magnet of a_9 would be part of the proton-beam transport for m_6.

Concluding Remarks

We believe that the proposed lay-out represents a workable solution. Disturbance to other users and experiments has been minimized, and it will be possible to operate the beam simultaneously with m_6 at all times, and simultaneously with the large-angle-scattering experiment during setting up.

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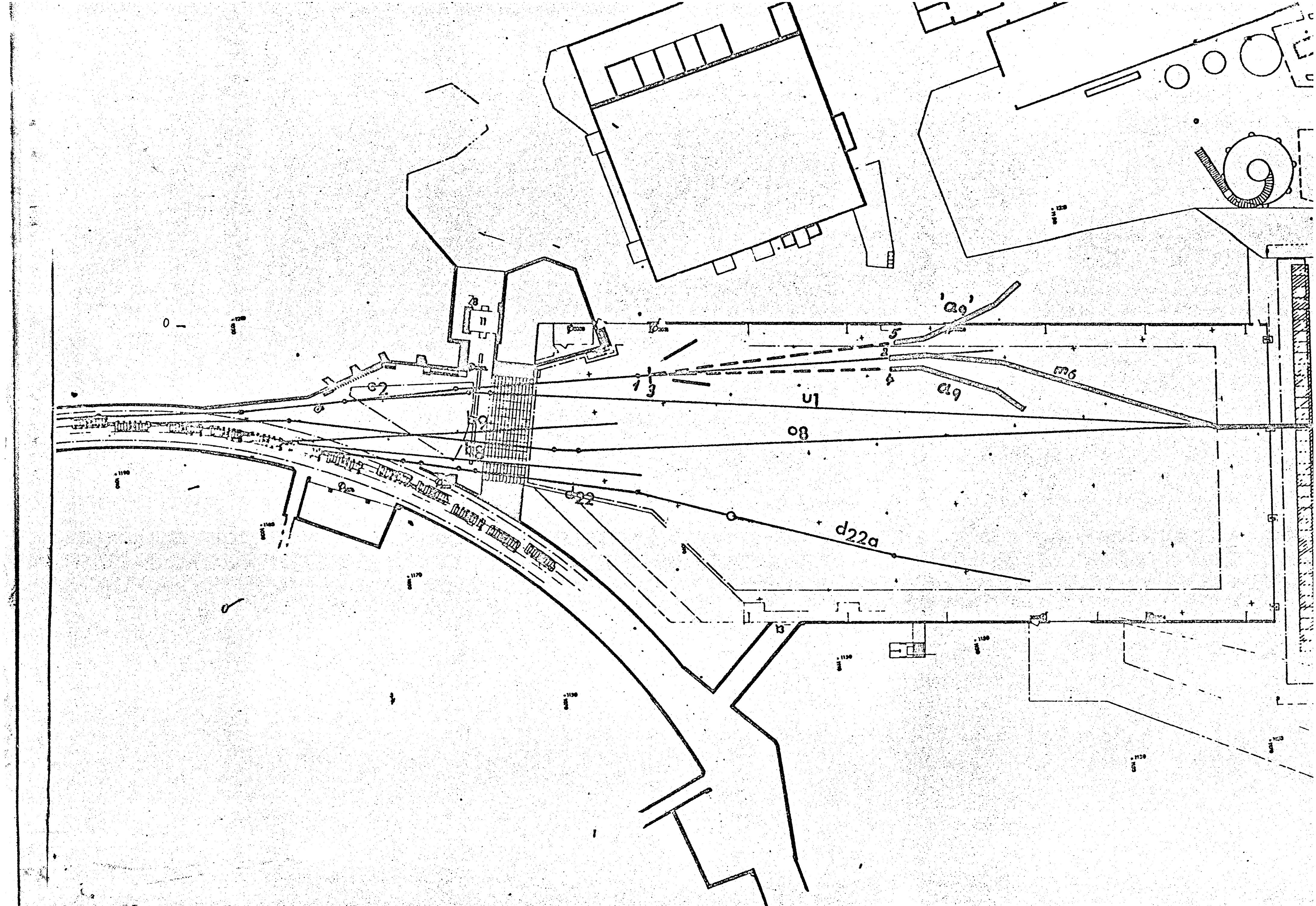

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