

IMPORTANCE OF OPTICAL ACCESS FOR AN ALPHA PROJECT MAGNET

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In a number of individual experiment studies in the July session of the 1969 Summer Study, a large single-magnet multi-particle-detector system is proposed. In some cases the detection system proposed is a streamer chamber, in some cases a many-planed wire-chamber system. It is the purpose of this note to emphasize that if a large magnet is built for such experiments, as proposed in SS-87 on the Alpha Project, then it is important that it be designed so that it can be used with optical access for a streamer chamber or for optical spark chambers.

We do not know at this time whether such a visual detection system or a wire-chamber system will prove to be generally more useful. At present, the optical-type detectors are in fact operational (cf. CERN Omega Project plans and the SLAC streamer chamber) while no many-planed wire-chamber system of comparable generality for 4π solid angle and multi-particle events has yet been put into operation. It therefore would be premature at this time if a large magnet system for general multi-particle detection were designed purely for non-visual detection systems and designed in such a way as to make it difficult to obtain visual access.

The question of visual access has some bearing on the ease of obtaining a highly homogeneous field and also some bearing on the cost of the magnet. As for field homogeneity, we believe that inhomogeneities of the order of 10% are tolerable and will not require excessive computer time for precise track reconstruction. These beliefs are based on rough information available at present; more detailed studies should be made.

Even if inhomogeneities such as will be produced by a hole in a pole were, however, to produce considerable increases in computer time required, we would still recommend that a large magnet for a multi-particle detection system be designed so that visual access is possible, presumably by removal of a replaceable plug in a pole. The optical-type detection systems, and the streamer chamber in particular, offer a very great generality in sensitivity to outgoing particles of various momenta and directions, and it is essential that it be possible to use such visual detection systems in a multi-particle detector installation.

