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THE FUTURE LAYOUT OF SEPTUM MAGNETSFOR THE SLOW EJECTION TO THE EAST HALL

D. Bloess

Introduction

The present septum magnet arrangement for the slow ejection to the East Hall (SE62) suffers from a number of drawbacks :

- 1) The reliability of the septum magnet in s.s. 62 is rather low, due to the very high current density in the septum.
- 2) The vacuum tank for this septum magnet is equipped with rubber O-rings, which further decreases the reliability of the ensemble. A straight forward exchange of rubber O-rings with metal joints is not possible.
- 3) The duty cycle of the current pulse of septum magnet 62 (SM62) is limited by the power supply (Schneider-Westinghouse) and by the septum magnet.
- 4) The vertical aperture in the SE62 channel is limited by the most delicat part: the SM62.
- 5) Due to the old tank construction the end vacuum and the pump down speed are far outside the specified values.

Two possibilities were studied which could improve this part of the SE62 :

- A) Improvement of SM62 and new construction of its tank
- B) A one-turn septum magnet in s.s.61 and a two-turn septum magnet in s.s.62, both mounted in standard vacuum tanks and providing respectively 5.5 and 12 mrad deflection.

#### Solution A

The improvement of SM62 would consist of an increase of septum thickness by 2 mm. This would result in an increase of duty cycle by approximately 20 - 25% if the reliability is kept equal. The vertical aperture cannot be improved, otherwise the SM62 would no more fit between the PS magnet coils and one would lose about 35% of the septum magnet length and the current density in the septum would also increase by the same amount. The septum tank can be built without rubber O-rings, but it would be a completely new construction; at least 3 tanks have to be built in order to have sufficient spares and test equipment available. The specified pump down speed can probably not be achieved. However, the improved septum magnet would also fit into the existing tank and therefore the increase of the duty cycle could already be obtained by mid 1976.

The SPG 1 power supply can be used with this magnet (free for SE62 from ~ October '75), the cable connections exist already. According to extrapolations from a machine development on SE16 at medium intensities, there will probably not be any significant additional losses in SM62 due to the restricted vertical aperture.

#### Solution B

New septum constructions with 7 and 15 mm septum thickness would be used in standard vacuum tanks in s.s.61 and s.s.62 respectively. With this solution all present drawbacks can be avoided; it will however not be available before the beginning of 1977.

Both septum magnets would be connected in series to the SPG 1 and an additional power supply, injecting current into SM62, would allow trimming between deflections of SM61 and SM62 and avoid a limitation of the duty cycle of the SPG 1 when running at maximum current.

It should be mentioned here that one could avoid the trimming supply if one accepts a limitation in duty cycle or vertical aperture and if one is absolutely sure that the ratio of deflection between SM61 and SM62 will not be changed in operation.

The following table compares the two solutions : (see page 4)

SM61/SM62

SM62 improved

DUTY CYCLE	improved by 20 - 25%	no restrictions within possible PS cycles
VERTICAL APERTURE	as now : 20 mm	no restriction : 30 mm
RELIABILITY	no improvement for septum magnet, better vacuum tank	improved, comparable to TSM 85
VACUUM	rubber O-rings avoided, probably poor pumping down speed	improved, comparable to TSM 85
INSTALLATION	not before mid 1976	not before beginning 1977
PRICES	<p>new tank and mechanism construction</p> <p>2-3 man years ~ 100KF</p> <p>3 tanks to be built with ~ 300KF</p> <p>3 mechanisms</p> <p>septum magnets ~ 300KF</p>	<p>2 standard tanks and ~ 300KF</p> <p>4 mechanisms to be built ~ 100KF</p> <p>additional power supply</p> <p>power cables, cooling, 50KF</p> <p>controls, interlocks 240KF</p> <p>septum magnets</p>
TOTAL	~ 700KF	~ 690KF

This note is hopefully an objective summary of discussions and remarks  
of :

- R. Bertolotto (septum magnets and supplies);
- D. Dekkers and Ch. Steinbach (possible future beam losses and operation);
- L. Hoffmann (East Hall beam utilization);
- W. Kubischta (SE62 theory);
- R. Mosig (trimming supply);
- C.E. Rufer and P. Mann (vacuum and tank construction);
- W. Wünsche (septum magnets and vacuum tanks).

Distribution:

MAC  
Section AE/SMS  
R. Bertolotto  
G. Héritier  
W. Kubischta  
P. Riboni  
Ch. Steinbach  
W. Wünsche