BROOKHAVEN NATIONAL LABORATORY

MAGNET DIVISION NOTES

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Title: Absorbing the increased cable insulation thickness in 130 mm aperture RHIC Insertion Quadrupoles

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Absorbing the increased cable insulation thickness in 130 mm aperture RHIC Insertion Quadrupoles

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At the time when the cross section of 130 mm aperture RHIC insertion quadrupoles was designed[1], it was assumed that the fiberglass insulation would be used on the cable. However, the present plan calls for using the Kapton CI insulation which increases the thickness of the insulated cable[2] by $\sim$ 0.8 mil. Since there are 27 turns in the basic cross section, this would mean a 22 mil increase in the pole angle which is unacceptable from the field quality considerations. To retain the designed pole angle one would have to squeeze coil much harder to reduce the pole angle by 22 mil.

In this note we present another option. This involves reducing the size of the wedge closer to midplane by the above amount (22 mil). This is a rectangular wedge with a thickness of 61 mil (plus insulation on it). In this process none of the allowed harmonic would change by more then 1 unit. Of course, if so desired, one can take an intermediate approach in which part of the reduction is absorbed in the wedge and a part in squeezing the cable harder.

References

1. R. Gupta, P. Thompson, "Cross Section for 130 mm Aperture RHIC Insertion Quadrupoles", Magnet Division Note No. 398-16 (RHIC-MD-121).

2. M.D. Anerella and J.D. Schmalzle, "Conductor Spacing in SSC and RHIC Dipole Magnets", Magnet Division Note No. 422-5 (RHIC-MD-135), February 27, 1992.