ROTATING COILS

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MEASUREMENTS OF FIELD QUALITY IN HELICAL DIPOLES FOR RHIC

Animesh Jain (BNL) told us that BNL is producing helical dipoles for Siberian snakes and spin rotators to be installed in RHIC. The magnets are 2.4m long and the field rotates 360° over this distance. Axial variation results in a 3D field. These fields were measured using very short rotating coils, in the order of just 51mm long and with a radius of 34.2mm. Tangential coil winding is 56 turns with two dipole buck windings of six turns each. Measurements were done at a single location in the center of the magnet and also in several axial positions at different current settings. It turns out that the short length of the coil allowed higher order harmonics to be measured precisely. The Z-scan measurements showed quite a bit of axial variation in the lower order harmonics.

A SYSTEM FOR SERIES MAGNETIC MEASUREMENTS OF THE LHC MAIN QUADs

Nikolay Smirnov (CERN) said that there were more than 400 twin aperture lattice quadrupoles needed for LHC. They plan to measure them all cold with unprecedented accuracy. He went on to describe the measurement system that they have designed, built and calibrated to do this. The system includes an automatic scanner which is 13m long and based on a ceramic shaft. This is very heavy but also very rigid and seems to work well. The measurement probe has two coils, a 60cm long harmonic coil and a 10cm long axis coil. He described a complicated alignment procedure. The main field was measured and analyzed and the systematic error was in the order of <1%. The field direction was measured to better than .3mrad. Harmonic measurements were done and random noise found to be below .01 unit for higher harmonics and .05 units for the main field. Development continues and a second unit is being built.

TRUFFALDINO, A TOOL TO SIMULATE ROTATING COIL MAGNETOMETERS FOR ACCELERATOR MAGNETS.

Pierre Schnizer (CERN) reported that this software aims to identify weak spots in a rotating coil system to quickly identify them and thus improve the accuracy of the system. He described modeling imperfections due to electrical noise and vibration for example. He said certain imperfections were difficult to model such as a missing work on an encoder or a drifting power supply. He also said that imperfection modeling must be kept as simple as possible. Possible modeling sources of error could be from a motor, mechanical connections, rotating coils, angular encoder, cables or electronics. He then gave examples of applications and concluded that TRUFFALDINO was indeed a tool available to allow investigation of imperfections, the study of noise and that due to the modularity of its design new components could always be added.