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IBA S2C2: Median plane error produced by external magnetic shields and other equipment and its compensation by main coil shifts

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The S2C2 is the new compact proton-therapy accelerator for the IBA ProteusOne range of products. It is the first synchrocyclotron as well as the first superconducting cyclotron ever produced at IBA.

A study is made of the median plane error in the S2C2 due to the vertical asymmetry in the magnetic structure. A full OPERA3D model is used to calculate the magnetic field error. The main coils are shifted vertically in order to compensate this error in the extraction region. An analytical formula is derived for the median plane displacement.

The iron of the magnet is almost completely saturated because of the high magnetic field (5.7 Tesla in the cyclotron center) that is applied. One of the consequences of this is that subsystems with moving parts such as the cryo-coolers and also the rotating condenser (rotco) require magnetic shielding. Another consequence is that the cyclotron is more sensitive to magnetized iron that is placed at the exterior of the machine because for such an additional source of flux, the pole and yoke almost behave like air and therefore do not provide any magnetic shielding.

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poster

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