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IBA S2C2: Coil forces and median plane errors due to coil displacements

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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.

During the commissioning of the S2C2 it is intended to move the main coil assembly in the cryostat into an optimum position such that the overall effect of the median plane error during acceleration and extraction has the smallest impact on the extracted beam. The main coils are held in position by horizontal and vertical tie-rods. This allows placing these coils with five degrees of freedom (3 displacements and 2 rotations). During this operation care has to be taken, because the forces and torques acting on the coils can be large. Furthermore the system is unstable, in the sense that the forces acting on a displaced coil are directed such that they intend to increase the displacement.

A study is made of forces and torques that act on the main coils and the median plane errors that are produced due to coil displacement and rotations in the S2C2. Four different OPERA finite elements models in 2D as well as 3D are used to calculate and compare these quantities.

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poster

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