



Contribution ID: 1567 Contribution code: THPM095

Type: **Poster Presentation**

Finite element study of AC losses in the superconducting coil of the NHa C400 cyclotron

Thursday, 11 May 2023 16:30 (2 hours)

The NHa C400 is the first compact superconducting cyclotron used for carbon therapy in the world. Carbon therapy is particularly effective for treating radiation-resistant tumors, as compared to more conventional radiotherapy techniques.

In this work, a 3D finite element model of the Nb-Ti coil has been developed using the open-source solver GetDP. First, an accurate representation of the DC magnetic fields, required for beam dynamics computation, is obtained. Second, analytical models of increasing complexity for hysteresis losses in the superconducting filaments are investigated. For discussing their accuracy, a single filament model has been developed. Third, the heat loss in the Nb-Ti coils during energization of the cyclotron is evaluated based on a multi-scale approach involving the single filament model.

Funding Agency

Footnotes

I have read and accept the Privacy Policy Statement

Yes

Primary author: DENIS, Louis (University of Liège)

Co-authors: GEUZAINÉ, Christophe (University of Liège); VANDERHEYDEN, Benoit (University of Liège); KLEEVEN, Willem (Ion Beam Applications SA); NUTTENS, Vincent (Ion Beam Applications SA); Dr VELTEN, Philippe (Normandy Hadrontherapy)

Presenter: DENIS, Louis (University of Liège)

Session Classification: Thursday Poster Session

Track Classification: MC8: Applications of Accelerators, Technology Transfer and Industrial Relations and Outreach; MC8.U01: Medical Applications