



Contribution ID: 40 Contribution code: TUP12

Type: **Poster Presentation**

A novel design of superconducting magnet for ECR ion source

Tuesday, September 17, 2024 5:00 PM (1h 30m)

Since the powerful capability of producing high charge state ions for heavy ions and the long lifetime of the ECR ion source is deemed one of the most robust ion source types. So far, the 3rd generation ECR built with NbTi superconductor has a wonderful performance reference to the ECR used by LBNL and IMPCAS for a long time. However, this type of ECR has not got a well spread and further development either in accelerator systems or in other areas. The reason is its inefficiency of electromagnetic design and the complexity of mechanical structure design and technical realization. Aim to conquer this embarrassing situation of the 3rd ECR magnet. This paper proposes a novel structure design that combines minimal layers of solenoids and Discrete-Cosine-Theta coils that are embedded in the machined grooves. Besides the high magnetic field generation efficiency, this structure can also reduce the accumulation of the coils' Lorentz forces. The details of the electromagnetic mechanical design of this new magnet structure will be described in this paper.

Footnotes

Funding Agency

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Yes

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Session Classification: TUP: Poster Session

Track Classification: MC2: New Concepts and Next Generation