



## **Innovation partnerships in magnet technology:**

## Novel superconducting septum magnets for highenergy accelerators, energy-efficient accelerator concepts and medical applications.

To overcome the magnetic field limits of 3. Compact and energy-saving magnet for

and a second second

Host Organizers

conventional septum magnetic field finitis of conventional septum magnets, GSI has proposed a new design for a truncated cosine-theta magnet. GSI/FAIR, together with the FREIA laboratory and EXAMEC AB, is developing a proof-of-concept study as a step towards the production of a prototype magnet for future accelerators and medical applications.

## Description

A conventional septum magnet has a magnetic field limit of ~2 Tesla. To overcome this, GSI proposed a truncated cosine-theta magnet. In a preliminary study funded by Big Science Sweden, GSI/FAIR, along with partners FREIA Laboratory at Uppsala University and EXAMEC AB, is developing a proof-of-concept study as a step towards producing a prototype magnet for future medical accelerators: Collaboration with medical accelerator facilities to understand specific needs and constraints, and conceptual design collaboration exploring innovative approaches.

## **Technology classification**

Superconductivity and superconducting magnets, TRL 3.

We are looking for partnerships with industrial partners active in the research and development of magnet technology, manufacturers of superconducting and normal conducting magnets, septum magnets for synchrotrons and medical accelerators to enhance the project's development and implementation.





accelerators (CERN-FCC, GSI/FAIR-SIS300) and medical applications.

The study aims to develop a model based on the design and create a roadmap for more advanced versions, enabling the development of a new superconducting truncated cosine-theta magnet for accelerators and medical use. The current study shows promising prospects for future collaboration in magnet technology development.

Future partnerships are desirable in the following areas:

- Production of a superconducting prototype magnet: Building on insights from mock-up production and testing, this includes detailed engineering design, production, and testing of the superconducting magnet.
- 2. High-Field Septum Magnet for FAIR or FCC:

Partners





ETamec

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Truncated Cosine-Theta Magnet Design, © K. Sugita

A detailed study targeting a 4 T high-field septum magnet suitable for future accelerators (GSI/FAIR SIS300, CERN-FCC), including iterations of electromagnetic and engineering design (mechanical, cryogenic, etc.), production, and testing.





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