



Contribution ID: 1847 Contribution code: THPB071

Type: **Poster Presentation**

Thermal-structural analysis of the Korea-4GSR vacuum chambers

Thursday 5 June 2025 15:30 (2 hours)

The Korea-4GSR is a fourth-generation synchrotron radiation accelerator with an energy of 4 GeV, a beam current of 400 mA, and a circumference of 800 m. To satisfy the performance requirements of the storage ring, the gap between the electromagnets and the vacuum chamber is designed to be extremely narrow, from 1.5 mm to 2 mm. A portion of the synchrotron radiation generated in the storage ring is delivered to the beamlines, with most absorbed within the storage ring using various types of photon absorbers installed throughout the system, while some photons are directly absorbed by the vacuum chamber. To prevent interference caused by thermal deformation of the vacuum chamber during this process, stress, deformation, and temperature distributions due to synchrotron radiation were analyzed using Ansys.

This study proposes optimization strategies to ensure the mechanical stability of the vacuum chamber under synchrotron radiation exposure.

Footnotes

Paper preparation format

Word

Region represented

Asia

Funding Agency

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Session Classification: Thursday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T14 Vacuum Technology