



Contribution ID: 1015 Contribution code: WEPM055

Type: **Poster Presentation**

Designs and measurements of a new Superbend-magnet for WALS

Wednesday, 10 May 2023 16:30 (2 hours)

In order to provide hard X-rays with a 1.5 GeV electron ring, a new superbend-magnet will be used in the middle of each standard cell at Wuhan Advanced Light Source (WALS). The design, assembly, and detailed magnetic measurement of the superbend-magnet prototype has been finished. It is a three-stage combined magnet, with a high-field permanent magnet in the middle and two low-field electromagnets with transverse gradient on each side. The results of magnetic measurement show that the central magnetic field reaches 3.67 T in a gap of 14.72 mm, and the range of high field region (> 3.5 T) is larger than 40 mm in the longitudinal direction. The uniformity of the field integral is controlled below $5E-4$ across the good field region. Two low-field magnets are designed as water-cooled resistive magnets which can be used to correct the integrated dipole and quadrupole components.

Funding Agency

Supported by Science and Technology Major Project of Hubei Province (2021AFB001)

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Session Classification: Wednesday Poster Session

Track Classification: MC7: Accelerator Technology and Sustainability: MC7.T09: Room Temperature Magnets