1. Record Nr. UNINA9911021968703321

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Titolo	5 T High Temperature Superconductor 3 Pole Wavelength Shifter Magnet for Accelerator-based Light Sources / / by Jeonghwan Park
Pubbl/distr/stampa	Singapore : , : Springer Nature Singapore : , : Imprint : Springer, , 2025
ISBN	9789819686797 9789819686780
Edizione	[1st ed. 2025.]
Descrizione fisica	1 online resource (148 pages)
Collana	Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5061
Disciplina	539.73
Soggetti	Particle accelerators Superconductors - Chemistry Magnetism Production engineering Accelerator Physics Superconductors Mechanical Process Engineering
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction -- Theoretial Background -- Design and Analysis Methods of Iron-core MI HTS WLS Magnet -- Core Manufacturing Technologies of HTS WLS Magnet -- Construction of HTS WLS Magnet -- Conduction Cooling Test Results of HTS WLS Magnet -- Conclusion -- Appendix.
Sommario/riassunto	This thesis reports the development of the world's first 5 T conduction-cooled metal-insulated (MI) wavelength shifter (WLS) magnet using high-temperature superconducting (HTS) technology. Overcoming key challenges such as Lorentz force-induced stress, screening current effects, and the limitations of liquid helium cooling, this study introduces a conduction-cooled MI HTS magnet with innovative electromagnetic, mechanical, and thermal design methods. The research establishes core manufacturing technologies, including precision winding, jointing, and cryogenic integration, ensuring stable operation below 20 K. A 3D screening current-induced field analysis model is developed and experimentally validated, offering insights into

field distortions and mitigation strategies. Achieving a record 5 T field, this is the first domestically produced HTS WLS magnet. Its application in the Pohang Light Source II storage ring is expected to enhance photon brightness by 1,000 times at 100 keV, advancing next-generation accelerator technologies.