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Development of prototype magnets for the ultralow emittance storage ring ALBA II

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The ALBA synchrotron light source is in the process of a significant upgrade, aiming to become a fourth-generation facility by reducing its emittance by at least 20 times. The initial phase of this project involves a comprehensive prototyping program designed to validate various critical technologies, such as magnets, vacuum systems, girders, etc., essential for facilitating the impending upgrade. This paper focuses on the development of the prototype magnets to implement the MBA lattice designed by our Beam Dynamics group. The lattice presents unique challenges, notably a remarkable degree of compactness necessitating magnet-to-magnet distances of just a few centimeters. Additionally, stringent strength requirements are imposed on both the quadrupolar (up to 110 T/m) and the sextupolar (up to 5000 T/m²) magnets. In this paper we will describe the design details of the initial set of resistive-type prototypes, as well as the preliminary efforts to develop alternative designs making use of permanent magnets. This dual-track approach reflects our dedication to both conventional methods and innovative solutions for the upgraded storage ring.

Footnotes

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