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Design and commissioning of a dedicated multilayer monochromator for electron beam size measurements using the Heterodyne Near Field Speckles (HNFS) technique at the ALBA synchrotron

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Within the framework of the ALBA Diagnostics Group's participation in a Future Circular Collider (FCC) collaboration, a dedicated setup for electron beam size measurement based on Heterodyne Near Field Speckles (HNFS) has been developed and commissioned at ALBA Front End 21 using radiation from a dipole bending magnet. The setup incorporates a high-energy (20–30 keV), high-bandwidth ($\sim 1.3\%$) monochromator, entirely designed in-house, along with the colloid sample environment and the detector system with their corresponding supports. The monochromator features a 300 mm Si substrate with W/B₄C multilayer coating and operates in a vertical Laue reflection geometry. To reduce complexity for this HNFS-specific application, ultra-high vacuum (UHV) conditions and submicron precision mechanics are not required. The mirror assembly is housed within a standard DN400 CF chamber, mechanically coupled to the chamber itself. This chamber is mounted on a granite-based “skin concept” table, providing two degrees of freedom (vertical translation and tilt) for energy tuning and beam path insertion/retraction. The complete design and commissioning process of the set-up are presented in this paper.

Footnotes

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