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Progression of the development of a four-crystal monochromator for PETRA IV

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The development of a four-crystal monochromator (4CM) represents a crucial step in advancing beamline instrumentation for PETRA IV, DESY's upcoming ultralow-emittance synchrotron source. Conceived to fulfil the stringent requirements of fourth generation light sources, the 4CM as a device without high heat load should provide exceptional energy resolution, achieving a small energy bandwidth and stability while preserving beam quality. The poster presents the ongoing development of 4CM designed specifically for PETRA IV. Two different beamlines will be discussed and compared. Our approach focuses on optimizing the crystal arrangement, vibration control and precise alignment to achieve excellent energy resolution, band width selection and intensity. Utilizing silicon crystals in a channel-cut configuration, the monochromator ensures high mechanical stiffness and robust control, enabling stable operation over a wide energy range. In addition, the engineering challenges and solutions encountered during the design phase, including thermal management and mechanical stability, are outlined.

Footnotes

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