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Final design stage completed: SX-700 successor ready for production

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The 40-year-old SX700 monochromators are being replaced due to missing spare parts. The new monochromator reuses the existing synchrotron optics, reducing both integration effort and system costs. A key challenge was the eccentric motion of the 650 mm, 7 kg pre-mirror. A novel UHV-precision drive combining a planetary roller screw and torque motor was developed to provide high thrust and precision up to 1 degree/s over a 27 degree range*. This doubles the angular range of the original SX700 and enabling fast XUV energy scans. A new stepper-driven grating revolver alternates between two gratings. Absolute angle encoders, developed as RON905 replacements, provide 0.02 arcsec precision for both mirror and grating axes**. A specially designed tilted UHV chamber fits the space constraints while maintaining a compact overall structure***. Infrared monochromatizing and optical alignment via visible light diffraction with geodetic instruments are possible. After successful drive tests, the full design is finalized, and the first Prototype is ready for production. This poster presents the final design and compares its performance to modern monochromators.

Footnotes

* Patent: DE102022130836B3

** <https://doi.org/10.1016/j.nima.2021.165645>

*** Patent: DE102023101151A1

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