

## **Science and Innovation at the Sirius Light Source**

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SIRIUS, Brazil's fourth-generation synchrotron light source, is managed by the Brazilian Synchrotron Light Laboratory (LNLS) at CNPEM and funded by the Brazilian Ministry of Science, Technology, and Innovations (MCTI). As Latin America's only synchrotron, it provides cutting-edge experimental capabilities for researchers worldwide, covering techniques from infrared to hard X-rays. Operating at 3 GeV with 200 mA, SIRIUS supports up to 38 beamlines, with ten operational and four more in the commissioning or construction phase. The facility's advanced design enhances high coherence and brightness, enabling transformative research in agriculture, energy, environment, and health, aligning with Brazil's sustainable development goals. Since its launch in 2019, SIRIUS has transitioned from initial commissioning to regular user operations in 2023. Phase 2, approved in 2023, will add ten new beamlines, extend spectral capabilities, and enhance infrastructure, including a current upgrade to 350 mA. Complementing these advancements, the ORION project will integrate SIRIUS with Latin America's first Biosafety Level 4 (BLS4) laboratory, revolutionizing research on pathogens and diseases through state-of-the-art X-ray bio-imaging. This presentation will highlight SIRIUS's innovations, challenges, and potential to drive science and sustainable development in Latin America and beyond.