

SRI2 24

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Science and Innovation at SIRIUS

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SIRIUS, Brazil's fourth-generation storage ring light source, is managed by the Brazilian Synchrotron Light Laboratory (LNLS) at CNPEM and funded by the Ministry of Science, Technology, and Innovations (MCTI). As Latin America's only synchrotron, SIRIUS offers beamlines spanning from infrared to hard X-rays, accessible to researchers worldwide.

SIRIUS storage ring, operating at 3 GeV with a 100 mA current, features a 5BA magnet lattice designed for high transverse coherence. It supports up to 38 beamlines, with ten currently operational, two in commissioning and two in installation. The initial set of beamlines covers scientific programs and experimental techniques such as CDI, XPCS, μ and nano-CT, μ and nano-XRD, XAFS, SAXS, ARPES, RIXS, PEEM, and XMCD. Innovative advancements in optics, precision mechatronics, detectors, and computing technology support these experimental capabilities.

Since its inception in 2012, SIRIUS has leveraged expertise from UVX, Latin America's first synchrotron. By 2019, SIRIUS had achieved its first stored beam, and by the end of 2021, it had operated at 100 mA with six beamlines open for user commissioning. Regular operations for users began in 2023.

Aligned with Brazil's green economy strategy, SIRIUS prioritizes sustainable innovation and facilitates agriculture, energy, environment, and health research. Early publications highlight a commitment to sustainable development.

In 2023, the Brazilian government approved SIRIUS's second phase that will add ten more beamlines, extending SIRIUS's spectral range into the THz gap and harder X-rays; technical upgrades, such as the current increase to 350 mA; and infrastructure improvements.

Additionally, CNPEM's ORION project will establish Latin America's first Biosafety Level 4 (BLS4) laboratory, integrating advanced synchrotron X-ray bio-imaging techniques to allow scientists to see, in tri-dimensions, how pathogens infect animals and cause diseases, from the cellular up to the organism level.

This presentation will overview current and future advancements in synchrotron science enabled by SIRIUS, highlighting its potential for groundbreaking scientific breakthroughs.

I plan to submit also conference proceedings

Yes

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Track Classification: 11. Synchrotron radiation facilities: Facility updates and new facilities