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Synchrotron infrared nanospectroscopy in fourth-generation storage rings

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Fourth-generation synchrotron storage rings mark a significant advancement in synchrotron technology, providing exceptionally bright and precisely focused X-ray beams crucial for diverse scientific pursuits. Yet, their tightly configured magnetic lattices historically presented obstacles for accessing lower-energy radiation, like infrared (IR) and THz. Here, we unveil the inaugural IR beamline installed and operational within a fourth-generation synchrotron storage ring. Our efforts encompass several key breakthroughs, including a comprehensive analysis of the new IR source at Sirius, a detailed description of the radiation extraction method, and a validation of our optical framework through meticulous measurements and simulations. This optimized optical configuration has facilitated an impressively broadband range for our nanospectroscopy endeavors. By employing synchrotron IR nanospectroscopy on samples of biological and hard matter, we effectively showcase the practicality and efficacy of this beamline. We underscore the advantages of fourth-generation synchrotron IR sources, now capable of operating with unparalleled stability owing to the exacting standards for generating low-emittance X-rays.

References:
[1]. Santos, T. M., Lordano, S., Mayer, R. A., Volpe, L., Rodrigues, G. M., Meyer, B., Westfahl, H., & Freitas, R. O. (2024). Synchrotron infrared nanospectroscopy in fourth-generation storage rings. Journal of Synchrotron Radiation, 31(Pt 3), 547–556. https://doi.org/10.1107/S1600577524002364

I plan to submit also conference proceedings

No

Primary author: DE OLIVEIRA FREITAS, Raul (Brazilian Synchrotron Light Laboratory (LNLS))

Presenter: DE OLIVEIRA FREITAS, Raul (Brazilian Synchrotron Light Laboratory (LNLS))

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