ICALEPCS 2025 - The 20th International Conference on Accelerator and Large Experimental Physics Control Systems

Contribution ID: **256** Contribution code: **TUMR017** Type: **Poster Presentation with Mini Oral**

Enhancing scanning nano-tomography instrumentation with a magnetic levitation stage

Tuesday 23 September 2025 15:48 (3 minutes)

Next-generation synchrotron experiments—such as those planned for SOLEIL II—require fast, accurate sample positioning to meet increasingly demanding scientific challenges. To address these needs, SOLEIL launched the development of a magnetic levitation stage demonstrator dedicated to hard X-ray scanning tomographic nano-imaging techniques such as PXCT and STXM. Designing this new class of mechatronic instruments involves a significant shift from traditional stacked architectures used for point-to-point motion to advanced scanning techniques with high dynamics. It also requires substantial design innovations. The demonstrator was developed in the frame of the LEAPS-INNOV project. It integrates high-speed 2D scanning modes (step-scan and fly-scan) with full 360° sample rotation. SOLEIL's development strategy involves partnering with a company from the semiconductor industry that has built ultra-precise and highly reliable mechatronic systems. MIPartners company was selected through a "competitive dialogue"tender, allowing for iterative refinement of specifications.
This paper outlines the design principles that ensure performance and reliability in synchrotron instrumentation. The complete design workflow—from modelling to control implementation—will be detailed, along with the validation of the scanning nanoprobe stage. Results from factory and site acceptance tests, as well as the development of an external metrology bench to characterize the stage will be presented.

Footnotes

Funding Agency

This project has received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement no. 101004728

Manuscript formatting

Microsoft Word (docx)

Author: ABIVEN, Yves-Marie (Synchrotron soleil)

Co-authors: Mr PEREZ, Javier (Synchrotron soleil); Mr BISOU, Jérome (Synchrotron soleil); Mrs MUNOZ, Laura (Synchrotron soleil); Mr PRINCEN, Martijn (MI Partners); Mr SCHNEIDER, Ronald (MI Partners); Mr DUCOURTIEUX, Sébastien (Synchrotron soleil); Dr RUIJL, Theo (MI Partners); Mr VAN AERT, bas (MI Partners)

Presenter: ABIVEN, Yves-Marie (Synchrotron soleil)

Session Classification: TUMR Mini-Orals (MC03, MC04, MC08)

Track Classification: MC08: Diverse Device Control and Integration