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A new integrated x-ray diffractometer for advanced diffraction beamlines

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The advent at last generation synchrotron sources of extremely brilliant beamlines combined with fast photon-counter detector and high throughput sample changers change the paradigm of beamtime use. The time required by the diffractometer to handle the sample is the new bottleneck for the beamtime throughput. At IRELEC, we developed a new x-ray diffractometer aiming to close the gap and accelerate the whole process while pushing the mechanical precision and stability to new standard that exceed the usual requirements at modern diffraction beamlines. To reach this goal, we combined fast and synchronic translations to setup the sample environment with a high precision rotation stage keeping the ensemble very compact to minimize the in-air beam path and make the sample to detector distance as small as possible. To demonstrate the performance during our qualification tests on a first prototype, we had to tackle metrology challenge. The device and its performance are presented as well as the comparison of different method to perform the metrology. The commissioning at Synchrotron beamlines of this new device will be performed end of 2025 at APS and beginning of 2026 at MAX IV.

Footnotes

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