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## Fiber Bragg-Grating strain measurements on the APPLE –X undulators for SABINA

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SABINA (Source of Advanced Beam Imaging for Novel Applications) is a new IR/THz FEL source under construction at the INFN Laboratori Nazionali di Frascati (LNF). The FEL is a single-pass amplifier designed to operate in the 10-100 THz spectral range using the SPARC\_LAB infrastructure. The amplifier, consisting of three Apple-X undulator modules built by KYMA S.p.A., will deliver pulse energies of tens of microJoule with variable polarisation. The undulators were delivered to the LNF in 2023. In collaboration with ENEA, the mechanical structure was investigated for stability and deformations by strain measurements based on optical methods. The measurements have shown a clear deformation of the structure in the presence of varying magnetic forces. However, our conclusion is that the magnitude of this deformation is well within the tolerances required for the undulator functionality.

### Footnotes

INFN: Istituto Nazionale di Fisica Nucleare; National Institute of Nuclear Physics

LNF: Laboratori Nazionali di Frascati - National Laboratory of Frascati (Rome)

SPARC\_LAB: Sources for Plasma Accelerators and Radiation Compton with Laser And Beam

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