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Comparison of FEA simulations and experimental data for a new germanium detector for X-ray spectroscopy at synchrotron facilities

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As part of the European LEAPS-INNOV project, a new generation of high-purity germanium detectors has been developed for synchrotron applications requiring spectroscopic capabilities. This novel design focuses on the development of monolithic multi-element Germanium detectors for X-ray Absorption Fine Structure (XAFS) and X-ray Fluorescence Spectroscopy (XRF) applications. This article presents the thermo-mechanical simulation results of the final detector prototype, based on Finite Element Analysis (FEA). These results are compared with the first experimental data obtained in the laboratory. Numerical calculations were carried out using ANSYS software, simulating combined thermal and mechanical effects under cryogenic and vacuum conditions. The numerical studies presented here represent an extension and update of previous work conducted during the development of this project*,**.

Footnotes

*M. Quispe et al., "Thermal Mechanical Simulations of a New Germanium Detector Developed in the European Project LEAPS-INNOV for X-Ray Spectroscopy Applications at Synchrotron Facilities", in Proc. IPAC'23, Venezia, Italy, May. 2023, pp. 4389-4392. doi:10.18429/JACoW-IPAC2023-THPA181.

**M. Quispe, et al., "Thermal and vibrational studies of a new germanium detector for X-ray spectroscopy applications at synchrotron facilities", JACoW IPAC2024(2024) TUPR75. doi:10.18429/JACoW-IPAC2024-TUPR75

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