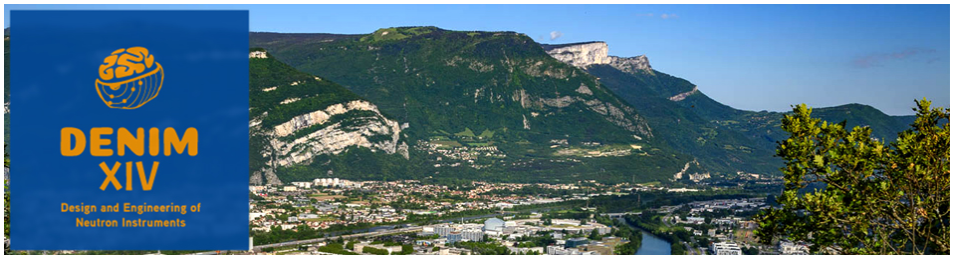

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Moving, re-designing and upgrading the T3 neutron optics test instrument at the ILL

Wednesday, 22 October 2025 11:45 (15 minutes)

At the ILL Multilayer Group, we coat multilayers (including supermirrrors) and produce optical devices like polarisers, wavelength filters and others. Having access to a reliable and performing characterization instrument is compulsory for this activity. The group owns a test instrument named T3, which was stopped in 2021 due to a large upgrade of the guide hall. The instrument moved to a new position on the new H15 guide. We took advantage of this imposed move to re-think its design in order to upgrade its capabilities, despite a constrained budget.
T3 is basically a cold monochromatic angle-dispersive polarized neutron reflectometer, which we also use for various measurements and tests in the field of neutron optics instrumentation. The essential requirement was to allow the measurement of polarizing mirrors in a reliable, reproducible and if possible even better way than before. Another vital one is to characterize assembled optical components in real conditions, typically polarizing benders with their mechanics and magnetic circuit. Other types of optical device developments would need a similar mode in order to be characterized: focusing mirrors, assembled guides, nested optics, etc. As an additional feature, the possibility to characterize monochromator crystals produced by the ILL Monochromator Group was considered. This Group runs test instruments using thermal wavelengths, but none of them is in the cold range.
We will give an overview of the design choices, from the most traditional to the most original ones. We will then outline the execution of the project, during which we seized a few opportunities and relied on cooperation within the ILL to optimize the efficiency of our available budget. The instrument is now being commissioned and run, which will allow us to report some measured performance, which are rather outstanding for a test instrument. We will then address the foreseen improvements and modifications, in relation to the initial requirements.

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