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Status and perspectives of the neutron imaging instrument suite at MLZ

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MLZ successfully operates the two neutron imaging beam lines NECTAR and ANTARES. NECTAR provides fast fission neutrons, thermal neutrons and gammas, which can be combined for multi-modal characterization of larger samples with spatial resolution down to $\sim 100 \mu\text{m}$. ANTARES offers a spectrum with a thermal maximum, extended towards cold neutrons, providing higher sensitivity and spatial resolutions down to $\sim 20 \mu\text{m}$.

Many applications, such as studying the water management within membranes of fuel cells of only a few μm thickness or lithium transport phenomena and dendrite growth in batteries, require high spatial resolution for small samples combined with a high flux cold neutron spectrum. Moreover, many scientific questions requiring modern and advanced imaging techniques (e.g. grating interferometry, Bragg edge imaging) would strongly benefit from a broader spectral range and a colder spectrum.

We propose to build a complementary neutron imaging instrument at a neutron guide end position, providing a small beam cross section and a cold neutron spectrum combined with an extremely low background. The instrument will be optimized for applications requiring high spatial resolution down to the single μm range and applications using advanced imaging techniques that will benefit most from the broad spectral range and the low background at a neutron guide, adding world-wide unique capabilities to the portfolio of neutron imaging applications at MLZ.

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