

## Ultracold neutrons from superfluid helium for a neutron lifetime experiment at ILL

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Conversion of cold to ultracold neutrons (UCN) via single-phonon emission in superfluid helium provides a viable mechanism to achieve high densities of UCN at the end of a neutron guide. In a current development at the ILL new sources based on this mechanism have been implemented at two monochromatic neutron beam lines. The first beam feeds an upgraded prototype source with characterized performance which will be used for neutron gravity experiments. Studies with a new source cryostat are underway at the second beam with the goal to further improve the technique of UCN accumulation and extraction. In first place this source will feed the neutron lifetime experiment HOPE which employs a magneto-gravitational UCN trap made of a vertical array of Halbach octupole permanent magnets with superconducting axial-field coils. With its simple, open geometry all necessary systematic checks can be performed in a transparent way. Perspectives to boost the performance of the UCN source to make it useful also for a neutron EDM experiment will be presented as well.

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