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# Overview of SuperSUN : A superthermal UCN source

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A new source of ultracold neutrons (UCNs), developed at the Institut Laue-Langevin (ILL) and named SuperSUN, is currently being commissioned. The source converts the cold neutrons, delivered by ILL's existing beam H523, to UCNs in a vessel filled with isotopically pure superfluid helium-4, wherein the inelastic scattering process transfers the neutron's energy and momentum to phonons in the superfluid. The inverse Boltzmann-suppressed process is negligible at temperatures below 0.6 K, enabling long storage times and high in-situ UCN densities. The SuperSUN conversion volume is illuminated by a primary beam with a white cold spectrum. Its cylindrical wall is composed of an m=3 supermirror which guides the cold neutrons inside the volume, and of a layer of Cytop which displays a large time constant for UCN storage. Using the full beam provides not only higher intensity around the wavelength 0.89 nm, where the dominant single-phonon process for UCN production takes place, but also a contribution to UCN production by multi-phonon processes. The beam stop at the end of the line was successfully tested, absorbing the radiation of the direct primary beam. Cryogenic tests have demonstrated the reachability of a temperature of 0.6 K of the conversion medium with an additional heat load of 100 mW, simulating the potential heat load from the neutron beam. A neutron characterization of the source will be performed to determine among others, the neutron density and spectrum that it can deliver to its first user, PanEDM.

**Primary author:** CHANEL, Estelle (Institut Laue Langevin)

**Presenter:** CHANEL, Estelle (Institut Laue Langevin)

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