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Ultracold neutrons source at NRC KI - PNPI for the study of fundamental interactions

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A more recently launched UCN source development utilizes superfluid helium (He-II) as conversion medium of cold neutrons into ultracold one. Initially proposed and designed for PNPI's old WWR-M reactor, the project has been reshaped to equip the institute's PIK reactor with a modern UCN source of this type. The projected UCN density in the closed source chamber is 2200 cm^{-3} , which, as calculations of neutron transport show, will provide 200 cm^{-3} in the chambers of a neutron EDM spectrometer connected to the source by a UCN guide. In general, a broad research program is planned. The UCN guide system has been designed to feed up to five experimental facilities. At the start of its operation, it is planned to equip the UCN source with experimental setups already available at PNPI: an nEDM spectrometer and two neutron lifetime experiments, one with a gravitational and one with a magnetic trap. Experiments at PNPI with a full-scale UCN source model have demonstrated that a heat load of 60 W can be removed from the He-II in the converter at a temperature of 1.37 K. This fact confirms the practical possibility to implement low-temperature converters under "in-pile" conditions with large heat inflows. At present, the manufacture of the source is close to be completed and preparations are underway for its preliminary tests.

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