

## Development of the high-brightness HEC-2 cold neutron source at the reactor PIK

*Monday, 20 September 2021 16:25 (25 minutes)*

The main goal of the created cold neutron source on horizontal experimental channel HEC-2 of reactor PIK is to obtain the maximal neutron brightness. There are two main possibilities for using two different material as a main body in the thermalisation chamber of the source: the liquid deuterium or the parahydrogen. When using optimal size and form of the chambers they give nearly equal brightnesses of the source. There are different pro and contra for using each of this options. Here we made the comparison of these two possibilities within neutron physical calculations.

Liquid deuterium as well as liquid hydrogen may present in two spin state in the mixtures: para- and ortho-states. Inelastic cross-section of para- and ortho- deuterium are similar but for hydrogen they are strongly different at energies smaller then 1 meV. For this reason the optimal form of the maximal brightness deuterium and hydrogen chambers will be strongly different. They will also have different heat loads. The brightness of the sources depends also on the position of the chambers in the heavy water reflector toward the reactor core. We made the optimization calculation of the form and the position of the liquid deuterium chamber to provide the maximal brightness of it and compare the obtained brightness and heat load with the brightness and heat load of the parahydrogen chamber of optimal size placed in the same position.

**Primary authors:** ONEGIN, Mikhail (Petersburg Nuclear Physics Institute); MITYUKHLYAEV, Victor (NRC «Kurchatov Institute» - PNPI)

**Presenter:** ONEGIN, Mikhail (Petersburg Nuclear Physics Institute)

**Session Classification:** Section 7. Synchrotron and neutron studies and infrastructure for their implementation

**Track Classification:** Section 7. Synchrotron and neutron studies and infrastructure for their implementation.