Joint seminar of the NPI of the CAS

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Ing. Přemysl Beran, Ph.D. (DNIM NPI):
ESS – a new type of spallation neutron source for scientific research

Abstract:

The European Spallation Source (ESS) is currently under construction in Lund, Sweden. When complete, it will provide a suite of 22 neutron beam instruments to the scientific user community, arranged around a spallation neutron target and moderator assembly, fed by a 5 MW proton accelerator. The facility, including all the instruments, is designed to provide world-leading performance, with new and unique instrumental capabilities providing the means to make progress and achieve breakthroughs across a broad spectrum of physical and biological sciences.
Unlike conventional pulsed spallation sources, where the proton pulse impacting the target is of the order of 1 μs in length, the ESS is designed to deliver significantly longer proton pulses. The ESS accelerator delivers a 2 GeV proton pulse of 2.86 ms in length, with a repetition rate of 14 Hz, impacting on a tungsten target in which fast neutrons are produced by spallation. These are then slowed down in a moderator reflector assembly, which will produce the world's highest brightness of cold and thermal neutrons, using liquid parahydrogen and water, respectively.
The 15-instrument suite, considered for the start of the user program in 2027, consists of two small-angle instruments, two reflectometers, an imaging beamline, two single-crystal diffractometers; one for macromolecular crystallography and one for magnetism, two powder diffractometers, and an engineering diffractometer, as well as an array of five inelastic instruments comprising two chopper spectrometers, an inverse-geometry single-crystal excitations spectrometer, an instrument for vibrational spectroscopy and a high-resolution backscattering spectrometer.
The presentation will provide an overview of the ESS construction status, including the instrumentation and plans for the start of the user program.