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#04-173 Progress and prospects on nuclear instrumentation development achieved through JSI – CEA collaboration

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The collaboration on nuclear instrumentation started more than ten years ago between the CEA Experimental Physics, Safety experiment and Instrumentation Section and the Reactor Physics Division of the Jožef Stefan Institute in the frame of bilateral agreement between CEA and the Slovenian Ministry of Higher Education, Science and Technology started in 2008.
More than ten development projects have then been successfully achieved on several subjects: miniature fission chambers, Self-Power Neutron Detector (SPND) and gamma-ray measurement techniques (using ionization chambers and Thermo-Luminescent Detectors (TLDs)), kinetic parameter measurement techniques (⊠eff), reactor dosimetry unfolding techniques and nuclear data improvements.
Since 2018, three common projects have been started: the first is dedicated to the calorimetry measurement techniques testing different materials sensitive to nuclear heating, the second project concerns improvement of neutron and gamma-ray measurement during power transient pulses and the last aims at establishing an experimental benchmark for a modelling scheme of neutron and gamma-ray sensors. After a short presentation of the two organizations'expertise in nuclear instrumentation and the aims and status of these three projects, the paper presents several themes identified as possible topics for future joint projects. The following topics will be addressed to cover the needs of experimental measurements for the future Jules Horowitz reactor reactor and fusion facilities: improvement of off-line neutron field characterization with the search for new inelastic scattering nuclear reactions for epithermal neutron dosimetry, and on-line, with the study of solid-state silicon carbide (SiC) based neutron sensors and the use of optical fibers as neutron or gamma-ray sensors. The development of liquid neutron filters, containing low concentration aqueous solution of boron, is considered as promising for experimentally simulating energy shifts in the thermal neutron peak in the neutron spectrum and thus allowing to obtain experimental data to support nuclear data evaluation and validation for various actinides.

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