



Contribution ID: 58

Type: **Flash presentation**

Development of Experimental Methods for Investigating Innovative Approaches to Nuclear Waste Management and to Nuclear Safety

Tuesday 26 September 2023 11:00 (15 minutes)

What happens to spent nuclear fuel? One promising future option might be fast (spectrum) reactors operated as a nuclear waste burners, i.e. fissioning plutonium and minor actinides (having half-lives of tens of thousands of years) and essentially leaving fission products with storage times in the range of hundreds of years. One such fast reactor concept is a molten salt fast reactor (MSFR). The project “NAUTILUS” aims at developing experiments to contribute to the nuclear data base that is needed for the assessment of the parameters and the safety of that reactor concept. The experiments will be conducted at the education and research reactor (AKR-2) of the TU Dresden, Germany.

The three main prerequisites of that goal, which represent major tasks of the project, are (1) the determination of the neutron spectrum of the AKR-2, (2) the simulation of the neutron spectrum of the AKR-2 as well as certain experimental devices, and (3) the development/establishment of the pile-oscillator and the neutron transition method at the AKR-2. The latter methods (3) in combination with the well-characterized neutron field (1, 2) will be employed aiming at reducing uncertainties in the nuclear data base of chlorine-35/37. The gained knowledge will be used to investigate the feasibility of the chloride-based MSFR as a waste burner and assess the safety of the system.

The flash talk motivates the MSFR concept in the given context and gives an overview about the project. Furthermore, the experimental and computational steps gone so far and upcoming work are highlighted.

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Session Classification: Flash presentation of the participants

Track Classification: Flash presentations