

Experimental setup of the ^{239}Pu neutron capture and fission cross-section measurements at n_TOF,

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Abstract: More accurate neutron capture cross-section data for ^{239}Pu are required for the design and operation of both current and future nuclear systems. As a result, the capture and fission cross-sections of ^{239}Pu are included in the NEA/OCDE High Priority Request List. To meet these needs, a new capture measurement was performed in the neutron time-of-flight facility n_TOF at CERN in late 2022 as part of the scientific program approved by the European Commission *H2020 Supplying Accurate Nuclear Data for energy and non-energy Applications* (SANDA). The experiment aims to improve previous ^{239}Pu capture measurements and obtain new α -ratio and fission cross section data to reduce current uncertainties in nuclear data evaluations. The detector system consists of the n_TOF Total Absorption Calorimeter (TAC) with 40 BaF_2 crystals and a new ionization chamber for the fission fragments, developed specifically for this measurement. The fission chamber operates in coincidence with the TAC and is used as a fission tagging detector to strongly reduce the background from fission reactions. In addition to the cross-section data, the measurement will also provide valuable information on the distribution of the γ -rays cascades emitted in $^{239}\text{Pu}(n,\gamma)$ and $^{239}\text{Pu}(n,f)$ reactions, as experienced in previous experiments performed with the TAC. This conference presentation will describe experimental activities performed during the ^{239}Pu campaign at n_TOF and present some first results from the data analysis, including fission yield obtained with the new fast fission detector and preliminary results on the capture yield.