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VERDI –a double fission-fragment time-of flight spectrometer

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The investigation of correlated fission characteristics like fragment mass- and energy-distributions is usually based on the double-energy technique using twin Frisch-grid ionisation chambers (IC). Providing the existence of prompt-neutron emission data the pre-neutron fission fragment mass and energy distributions may be obtained in an iterative process. However, those input data do not exist for isotopes other than 233,235U and 239Pu at sufficient detail, and extrapolation methods have to be applied when analysing neighbouring compound nuclear systems. The double fission-fragment time-of-flight spectrometer VERDI aims at investigating the neutron-induced fission fragment characteristics. Measuring fragment velocity and kinetic energy for both fission fragments simultaneously allows obtaining mass and kinetic energy distributions without introducing apriori information about prompt neutron emission. In addition, the measurement of pre- and post-neutron fission-fragment data provide prompt neutron multiplicity data as a function of fragment mass and total kinetic energy. In order to achieve a mass resolution deltaA < 2, ultra-fast time pick-up detectors based on artificial diamond material are used.

The spectrometer in its present single (v, E) version was tested for the first time in an experiment performed at the Budapest Research Reactor. The results of this experiment, the performance of the diamond detectors with fission fragments, time-of flight spectra and post-neutron mass distributions will be presented.

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