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Short_Oral_18: First measurement of neutrons produced by deuterium fusion reactions in SPIDER

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The inaugural Deuterium acceleration campaign in the SPIDER negative ion source facility in Padua has recently taken place. The first neutrons generated by Deuterium-Deuterium fusion reactions (2.5 MeV) have been recorded, occurring from the collision of accelerated Deuterium with Deuterium absorbed by the beam dump of SPIDER. A neutron detector based on a novel EJ276 plastic scintillator has been employed to successfully measure the neutron flux, which shows strong agreement with the extracted current of the acceleration grid. We have performed a neutron-gamma pulse shape discrimination characterization of the EJ276 detector at the ISIS Neutron source (241AmBe up to 10 MeV), as well as direct spectroscopic comparisons of the D-D neutrons with data from the Frascati Neutron Generator (241AmB quasi-monoenergetic 2.5 MeV). Despite the low statistics produced in this first campaign, both pulse shape discrimination and spectral analysis of the fusion neutrons was viable. The success of these first measurements has led to the installation of an array of 6 new scintillators to be used for further physical studies in future campaigns.

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