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Multipurpose Vacuum Accident Scenarios (MuVacAS) prototype for the IFMIF-DONES linear accelerator

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IFMIF-DONES* is a key device in the EUROfusion roadmap for studying and licensing materials for future fusion reactors. It will be a unique neutron fusion-like irradiation facility equipped with a linear particle accelerator impinging an intense deuteron beam (125 mA, 40 MeV) onto a liquid lithium target. In terms of safety analysis of the facility, relevant accidental scenarios are related to the technical impossibility of having a separation window between the liquid lithium target chamber and the accelerator vacuum chambers. In case of Loss of Vacuum Accident (LOVA), such as a sudden air/water inrush or leakage in the accelerator or target vacuum chambers, the beam duct could serve as a transport line and lead to air/water contact with liquid lithium, with the risk of exothermic reaction. The use of Fast Isolation Valves (70-100 ms closing time) is envisaged as mitigation mechanism for these events. The MuVacAS Prototype is an experimental setup to study in detail these scenarios and validate the Safety Credited mitigation requirements. For this purpose, it recreates the last 30 meters of the accelerator and target vacuum chambers and, it is equipped with dedicated instrumentation and modules for simulating LOVAs. This contribution presents an overview of the experimental setup together with preliminary numerical simulation of these accidental events.

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Footnotes

*International Fusion Materials Irradiation Facility - DEMO-Oriented Neutron Source

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Primary author: SABOGAL, Anderson (Universidad de Granada)

Co-authors: TORREGROSA, Claudio (Universidad de Granada); JIMENEZ-REY, David (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas); RODRÍGUEZ, Daniel (Universidad de Granada); MARTÍN-FUERTES, Francisco (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas); PODADERA, Ivan (Consortio IFMIF-DONES España); JUNI FERREIRA, Marcelo (European Spallation Source ERIC); CARA, Philippe (Fusion for Energy); IBARRA, Angel (Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas); DELGADO, Andoni (Fundación TEKNIKER)

Presenter: SABOGAL, Anderson (Universidad de Granada)

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