

The DONES Fusion Neutron Source*

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IFMIF-DONES – a powerful neutron irradiation facility for studies and certification of materials – is planned as part of the European roadmap to fusion electricity. Its main goal will be to study properties of materials under severe irradiation in a neutron field similar to the one in a fusion reactor first wall. It is a key facility to prepare for the construction of the DEMO Power Plant envisaged to follow ITER.

The optimal design for a fast neutron source was identified 40 years ago [1]. Neutrons with fusion relevant energy spectrum and required flux will be produced through ${}^7\text{Li}(d,n)$ stripping reaction with a D^+ beam at an energy of 40 MeV impacting on a flowing Li target. At present a worldwide development effort is ongoing: (i) the Engineering Validation and Engineering Design Activities are being pursued in Rokkasho as part of the Broader Approach agreement between the EU and Japan [2], (ii) the Early Neutron Source work package of EUROfusion consortium of European research units is preparing the Engineering Design Report of the future facility [3].

I will present the concept of DONES, the functions of its main systems and the projected parameters of the neutron flux. I will also report on the involvement of the Polish research units in the ENS work package of Eurofusion, in particular the proposal to extend the objectives of DONES beyond the fusion materials program, into other scientific areas [4].

[1] P. Grand et al., “An intense Li(d,n) neutron irradiation test facility for controlled thermonuclear reactor materials testing”, Nucl. Technol. **29** (1976) 327.

[2] J. Knaster et al., “The accomplishments of the Engineering Design Activities of IFMIF/EVEDA; the European-Japanese project towards a Li(d,xn) fusion relevant neutron source, Nucl. Fusion **55** (2015) 086003.

[3] A. Ibarra et al., “A stepped approach from IFMIF/EVEDA towards IFMIF, Fusion Sci. Tech. **66** (2014) 252259.

[4] A. Maj et al., “White Book on the Complementary Scientific Programme at IFMIF-DONES”, IFJ PAN Report No. 2094/PL, 2016.

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