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Title: Nuclear Data for Fusion Technology – The European Approach

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Abstract

The European Fusion Programme aims at the realisation of fusion as energy source for the production of electricity by the year 2050. The Strategic Energy Technology (SET) Plan of the European Commission thus assumes the construction and operation of a Fusion Power Plant (FPP) which can provide electricity to the grid. Three major facilities are considered to be required to achieve this ambitious goal: (1) ITER, as a key physics and technology facility for the “next step”, (2) a dedicated Elementary Neutron Source (ENS) for the material development, and (3) an early Demonstration Power Plant (DEMO) to enable a smooth extrapolation to FPP conditions. Accordingly the European Fusion Roadmap, implemented in the frame of the “Horizon 2020” programme, assumes that all know-how, required to start the construction of DEMO around 2030, can be acquired in time. A central element of this approach is the design of DEMO which is conducted in a dedicated Power Plant Physics and Technology (PPPT) programme of the EUROfusion consortium.

This approach builds on the availability of qualified computational tools and nuclear data as pre-requisites for the nuclear design, optimization and performance evaluation of the key facilities, ITER, ENS and DEMO including safety, licensing, waste management and decommissioning issues. To satisfy the needs for high quality nuclear data, a Consortium on Nuclear Data Development and Analysis was formed which provides the relevant services on the generation, maintenance, and validation of relevant nuclear data evaluations and data files. The related activities include the development/extension of codes and software tools which are required for nuclear model calculations and sensitivity/uncertainty assessments. Supplementary experimental activities are conducted in another Consortium to provide the data which are required for the validation of the nuclear data in neutronics design and activation calculations.

The paper provides an overview of the related Nuclear Data Development (NDD) activities with focus on the recent achievements in the area of nuclear data evaluations, benchmarking and validation, nuclear model improvements, and uncertainty assessments.