

Assmement of Bunker Suitability for a Fusion Neutron Source using Serpent 2

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Fusion research has gained significant ground in Bavaria as the Masterplan “Kernfusion und neuartiger Kerntechnologien” moves forward and presents the goal of significantly pushing nuclear technology. In addition, TUM held a symposium on Novel Nuclear Technologies with the clear recommendation to further study high energy fusion neutrons.

Thus, it is important to have a detailed understanding of the effects of such highly energetic 14.1 MeV fusion neutrons that carry most of the energy from a fusion reaction. To study such effects, e.g., interaction with materials or the knowledge of cross sections, the TUM Center for Nuclear Safety and Innovation (TUM.CNSI) consider buying and commissioning a fusion neutron generator. A prerequisite to installing such a neutron source however, includes ensuring proper shielding is in place to protect the users from the fast neutrons, gamma rays emitted from the device, below dosage limits set by the legal framework. This talk presents how the Monte Carlo code Serpent 2 is used to design a suitable bunker for a fusion neutron source. For a given neutron source rate, the thickness and type of concrete, moderator, and absorber materials are assessed. It is found that a bunker at one of the TUM.CNSI laboratories would be feasible.

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