

IFMIF-DONES HFTM neutronics modelling and nuclear response analyses

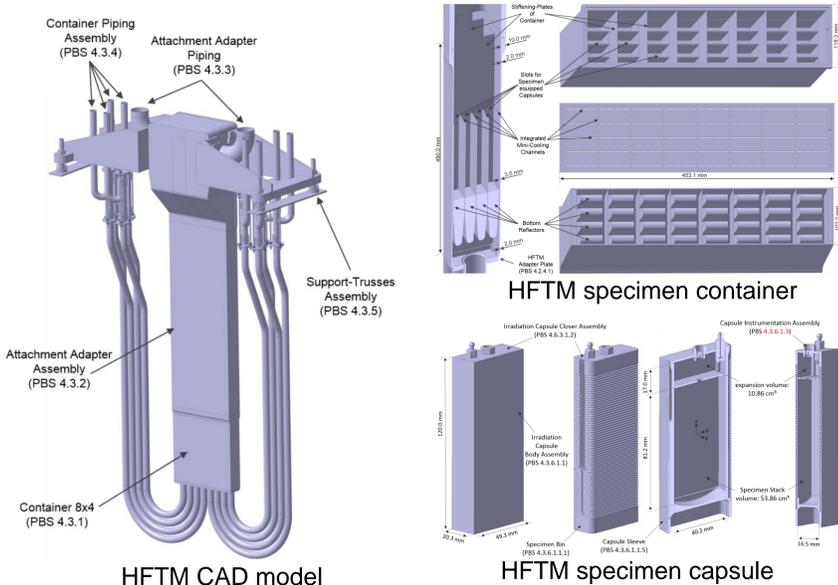
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Introduction

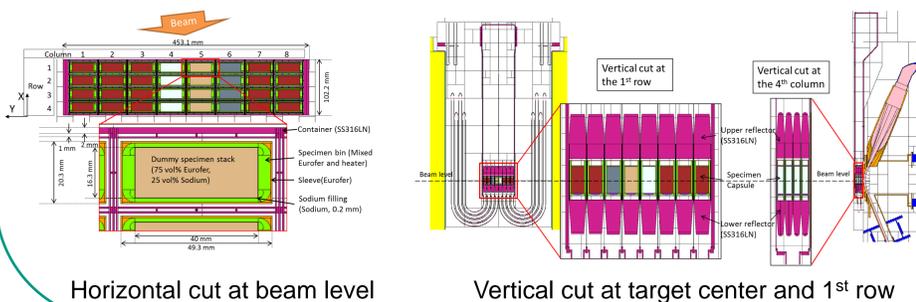
- IFMIF-DONES is a DEMO Oriented NEutron Source based on the IFMIF engineering design (IFMIF/EVEDA). A new design of the High Flux Test Module (HFTM) was recently developed which has many changes compared with the IFMIF/EVEDA HFTM.
- The neutronics model of DONES has to be updated to include the new HFTM. Also nuclear response analysis have to be performed.

Neutronics modelling

HFTM CAD model

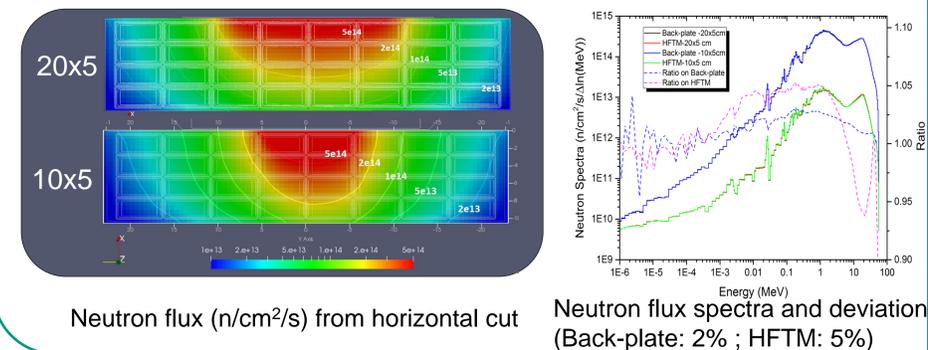


- Neutronics model for Monte Carlo code MCNP, using the McCad program developed at KIT.

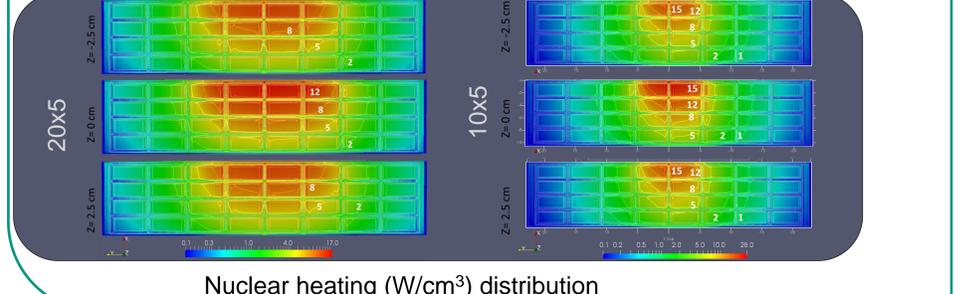
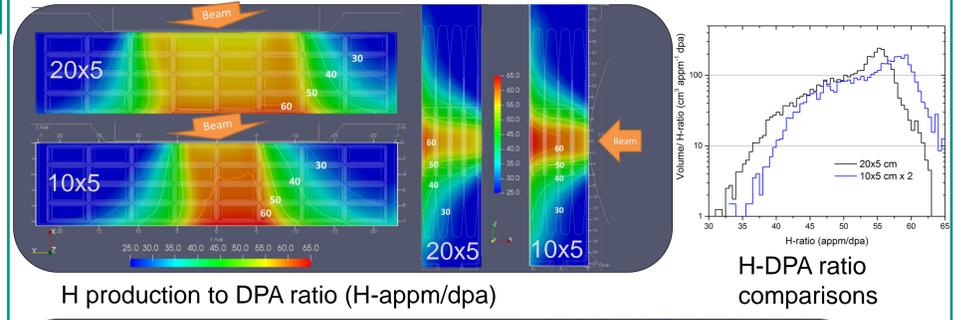
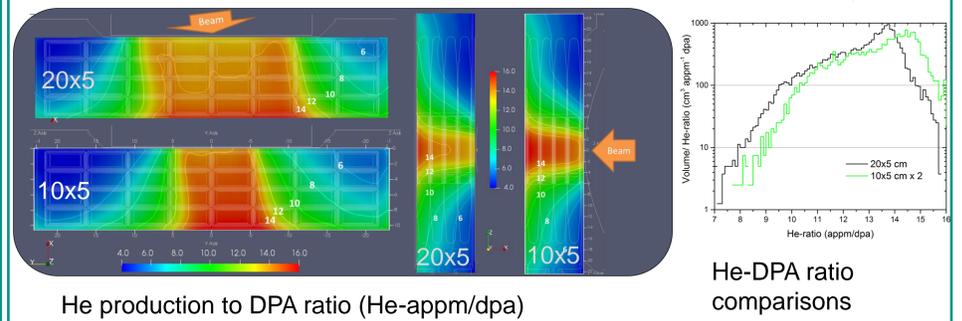
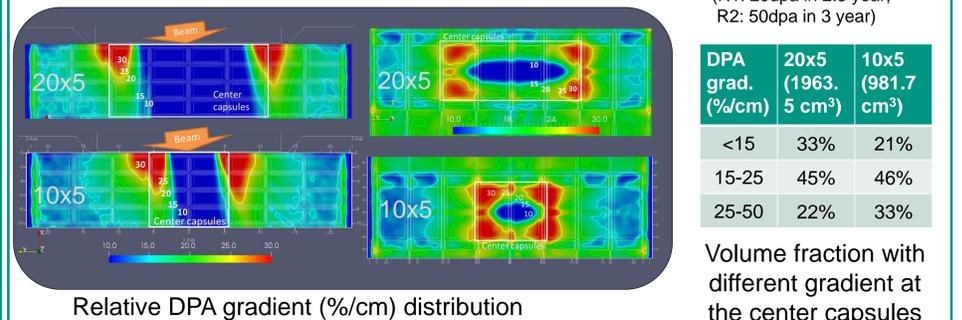
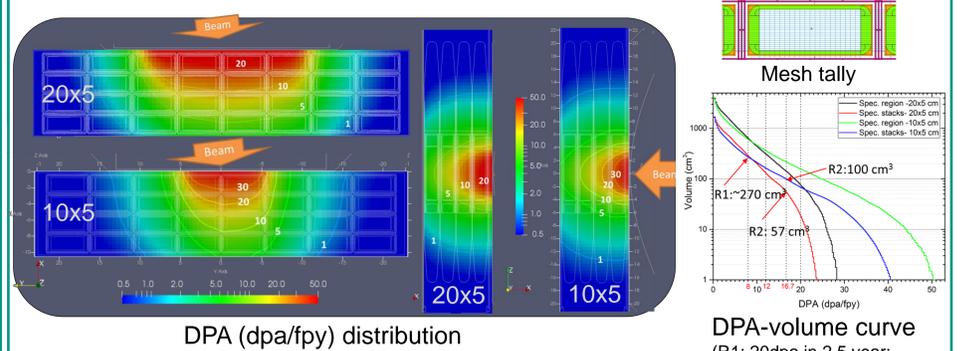


Nuclear response analyses

- McDeLicious-17 (MCNP6 version) and FENDL-3.1b neutron cross-section
- IFMIF/EVEDA beam profile with normal beam size 20 x 5 cm and reduced beam size 10 x 5 cm.



Nuclear response analyses (cont.)



Summary

- The neutron spectra using two beam size is similar.
- With reduced beam size, the volume producing 50 dpa in 3 years increases from 57 cm^3 to 100 cm^3 . The volume producing 20 dpa in 2.5 year is similar as normal beam size.
- With normal beam size, slightly better gradient is obtained on the concerned specimen region.
- With reduced beam size, the nuclear heating on the most irradiated specimen stack is almost doubled.