

Institute for Neutron Physics and Reactor Technology (INR) Karlsruhe Institute of Technology (KIT), Campus Nord

Hermann-von-Helmholtz-Platz 1 76344 Eggenstein-Leopoldshafen, Germany http://www.inr.kit.edu/

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# Preliminary Analysis on A Maintainable Test Cell Concept for IFMIF-DONES

Kuo Tiana\*, Frederik Arbeitera, Mark Ascottb, Oliver Croftsb, Gary McIntyreb, Gioacchino Miccichec, George Mitchellb, Yuefeng Qiua, Mátyás Tóthd, Angel Ibarrae

<sup>a</sup>KIT, Germany, <sup>b</sup>RACE, Culham Science Centre, United Kingdom , <sup>c</sup> ENEA C.R. Italy, <sup>d</sup>HAS, Wigner RCP, Hungary , <sup>e</sup>CIEMAT, Spain

#### IFMIF-DONES Reference Test Cell Design Test Cell Cover Plate (TCCP) Maior Features Sealing Plug (USP) ☐ Monothilic concrete biological shielding walls Lower Piping and ☐ Closed Liner covering internal TC surfaces attached to concrete Shielding **Cabling Plugs** (PCPs) ☐ Active cooling pipes embedded in concrete / attached to liner Potential Issues **HFTM** ☐ Risks in TC leakage, loss of cooling, components degradation, etc. unavoidable Lithium Quench ☐ Difficulties/infeasibility in maintenance of biological shielding, liner, cooling pipes Tank (QT) **Target** TC Surrounding Assembly **Shielding Walls** Test Cell Piping and Top Shielding Permanent Liner Cover Plate (TCCP) 0 1 2 m

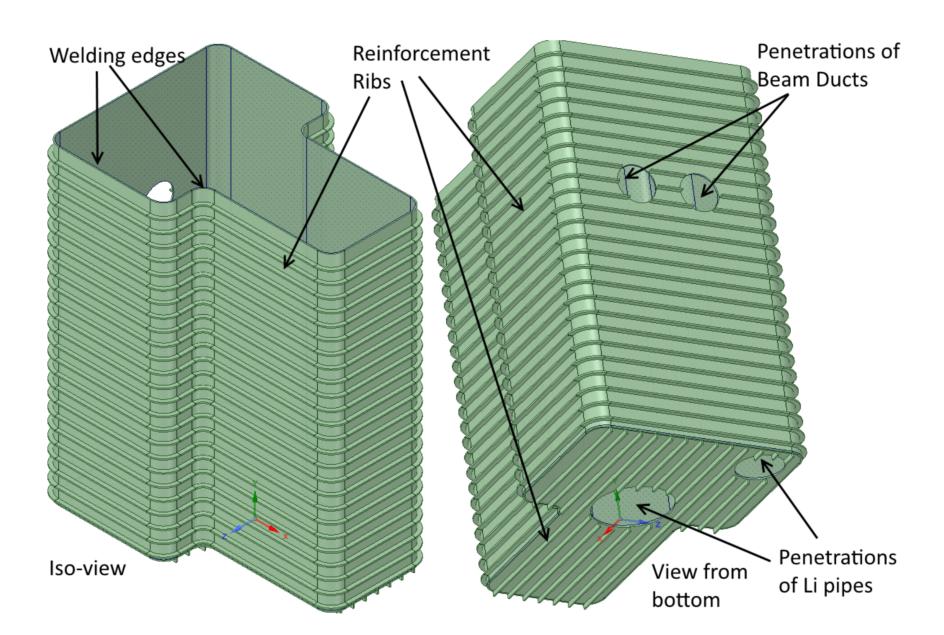
**Cabling Plugs** Section (PLS) Cutting and welding lines Replaceable **Liner Section** Duct Liner Replaceable **Biological** Shielding Section Assembly (TA) Li outlet Li Inlet Permanent **Biological Shielding Section** (PBSS) 2 m **TC-Lithium Systems** Interface Cell (TLIC)

Proposal of Maintainable TC Concept

Removable Liner Section (RLS) ☐ Liner incudes: Permanent Liner Section (PLS)

☐ Shielding walls includes Removable Biological Shielding Section (RBSS) Permanent Biological Shielding Section (PBSS)

## Preliminary FEM Analysis of RLS



TC-LS Interface

Cell (TLIC)

FEM Results of RLS under 1 bar pressure difference

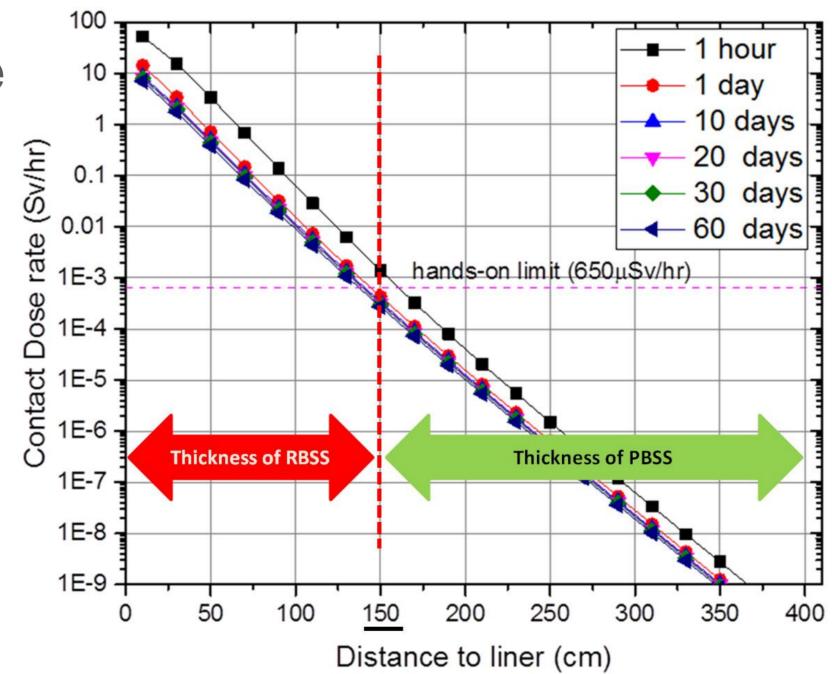
#### ☐ RLS and RBSS

- Receive intense neutron irradiation
- High active level (hands-on impossible)
- Active cooling required
- Removable for emergency maintenance
- Re-welding between RLS and PLS required during maintenance

#### □ PLS and PBSS

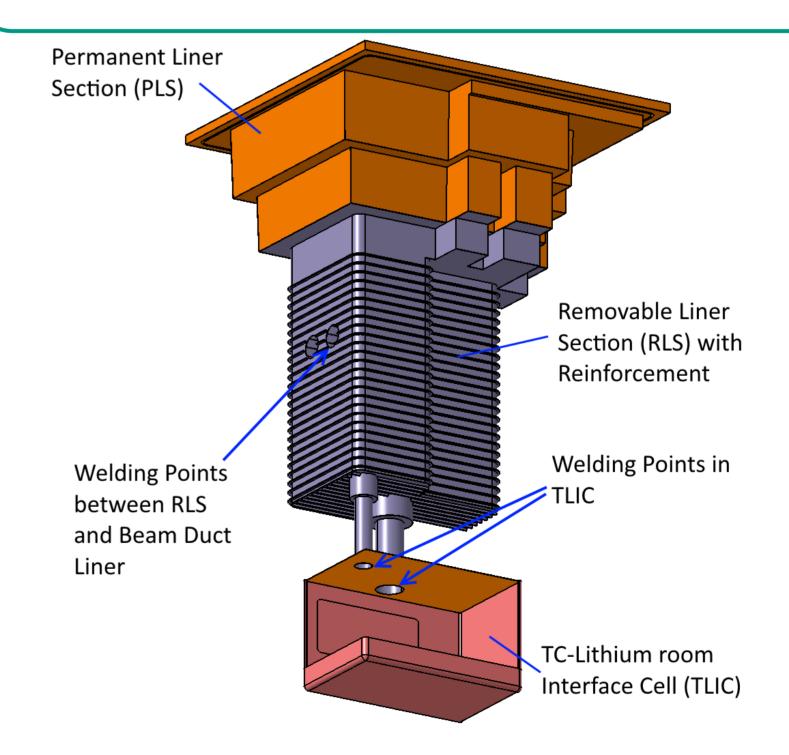
- Receive less neutron irradiation
- Low level activity
- No active cooling required
- o Permanent, integrated with facility civil structures

### Separation of RBSS and PBSS



Activation of Biological Shielding after 30 Years Operation

#### Maintenance of RLS



RLS detachment from TLIC and Beam Duct Liner (before RLS being removed)

\*Corresponding author: kuo.tian@kit.edu















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