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The Test Cell Configuration under IFMIF-DONES Condition

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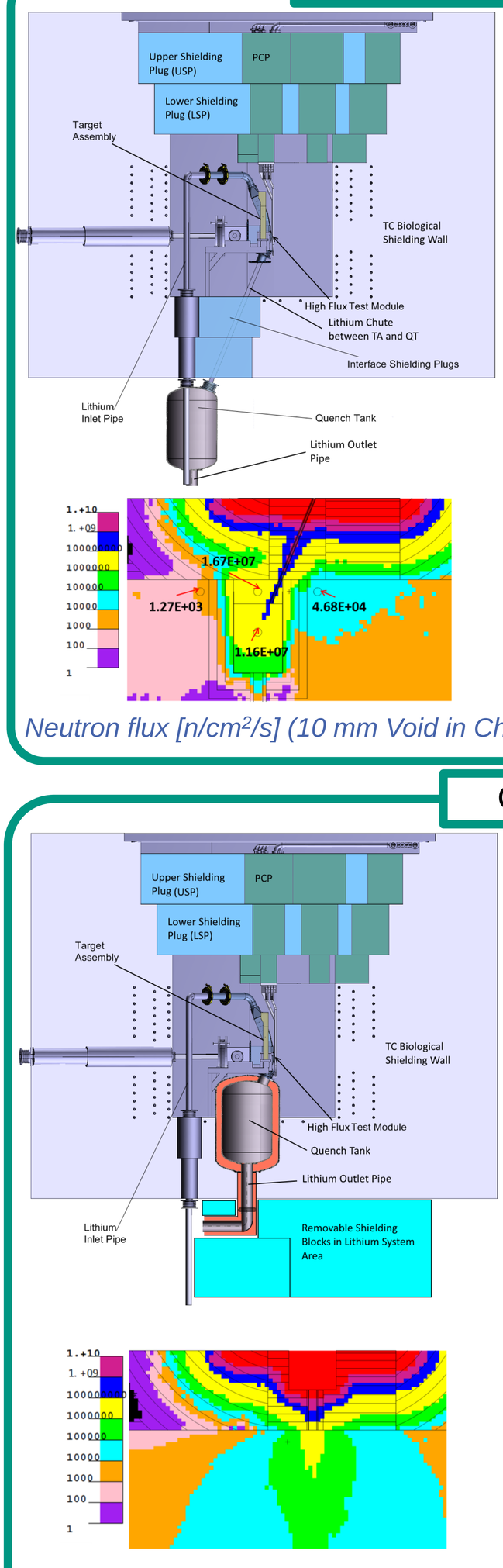
- IFMIF-DONES (**D**EMO **O**riented **NE**utron **S**ource) is an intensive neutron source based on the interaction of one 40 MeV 125 mA deuteron beam and a flowing liquid lithium target for fusion material irradiation experiments.
- Design of IFMIF-DONES Test Cell (TC) inherits, in a large extent, that of IFMIF-EVEDA Test Cell with major changes:
  - *IFMIF-EVEDA: **2**x 125 mA 40 MeV D+ Accelerator* — *IFMIF DONES: **1**x 125 mA 40 MeV D+ Accelerator*
  - *IFMIF-EVEDA: **HFTM**, MFTM, LFTM* — *IFMIF DONES: **HFTM***
- Design justification expected, key issue: Quench Tank (QT) arrangement and design of relevant components

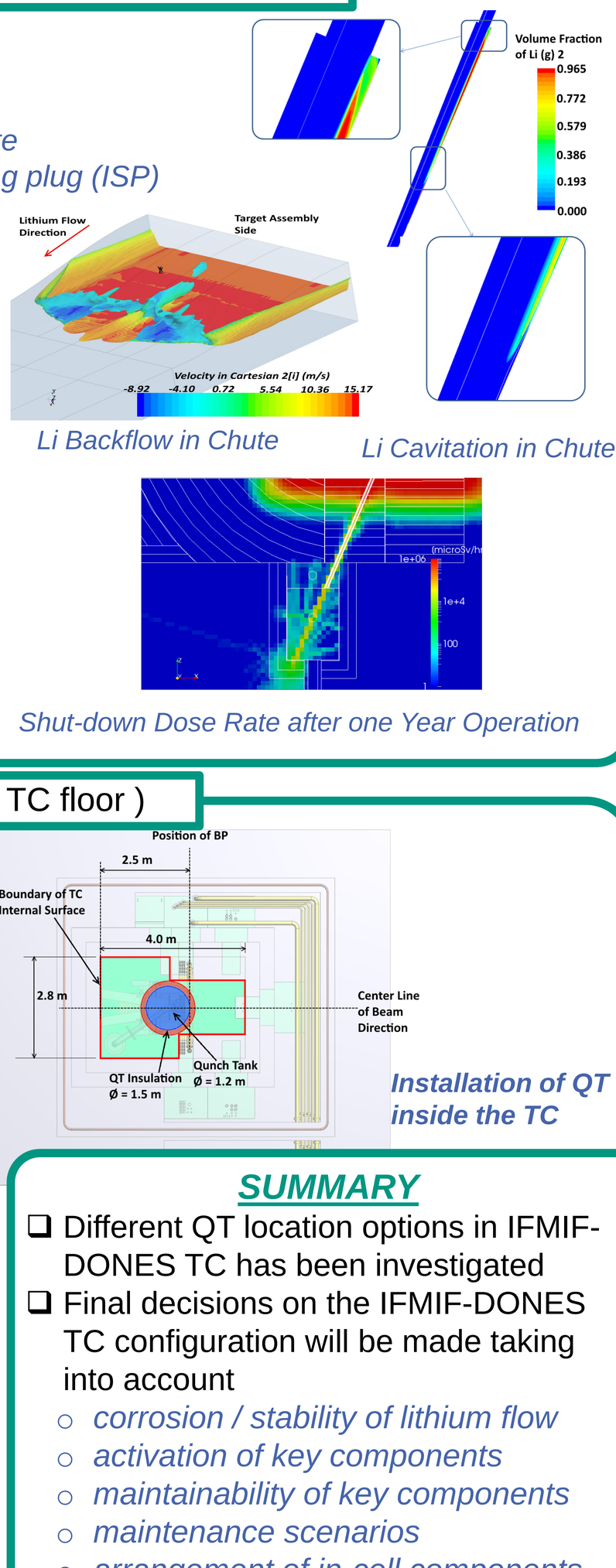
Reference Design of Test Cell (Quench Tank is arranged outside TC)



Neutron flux [n/cm²/s] (10 mm Void in Chute)

Major features:
- *Based on IFMIF-EVEDA TC design*
- *QT located below TC floor*
- *QT is connected with TA through a long chute*
- *The chute is installed in an interface shielding plug (ISP)*

Pros	Cons
Less TC radiative inventory	Lithium flow stability issue in the chute
Lower tritium generation than QT inside TC	Stress problem of long chute
Convenient in-TC arrangement	Hands-on Maintenance on QT unsolved
No impact on building configuration	Transportation of activated QT in Lithium System (LS) area
QT size no limit	Big ISP



Li Backflow in Chute

Li Cavitation in Chute

Shut-down Dose Rate after one Year Operation

QT arranged inside the TC (half-buried in the TC floor)

Neutron flux [n/cm2/s]

Major features:
- *QT is installed in the TC floor*
- *QT is directly connected to the TA*
- *TC floor keeps identical thickness as reference design*
- *Removable shielding blocks in LS area*

Pros	Cons
No Li flow stability issue	Higher TC radiation inventory
Less stress problem of pipes	Higher tritium generation
QT is removed through Access Cell in case of maintenance	Arrangement of in-TC components difficult
No impact on building arrangement	Hands-on Maintenance on QT impossible
Small ISP	QT size limited

Installation of QT inside the TC

SUMMARY

- Different QT location options in IFMIF-DONES TC has been investigated
- Final decisions on the IFMIF-DONES TC configuration will be made taking into account
  - *corrosion / stability of lithium flow*
  - *activation of key components*
  - *maintainability of key components*
  - *maintenance scenarios*
  - *arrangement of in-cell components*
  - *impacts on other systems and the building*

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EUROfusion

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The views and opinions expressed herein do not necessarily reflect those of the European Commission.