

Chamber Nuclear Performance

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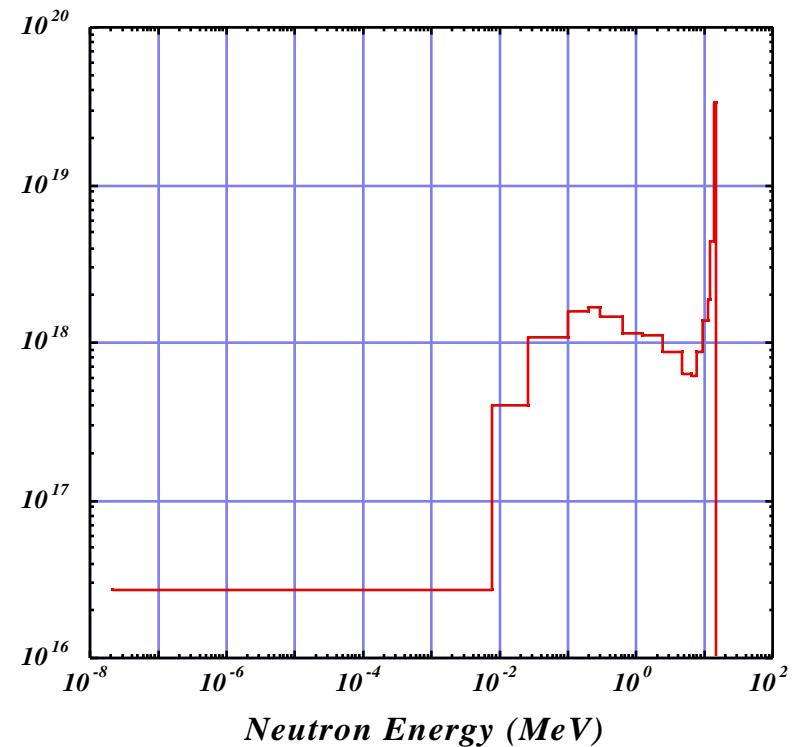
Chamber Parameters

- ARIES-AT-type **blanket**: SiC/SiC structure
Li₁₇Pb₈₃ breeder/coolant
- 1-2 mm C **armor** on FW
- 0.5-2 cm thick SiC/SiC **FW**
- 1 m thick **FW/blanket/shield**
- Replaceable FW/Blanket
- **Alternate armor and chamber designs will be assessed later**

Neutron Source Parameters

- 161 MJ yield
- 6 Hz rep rate
- ~1000 MW fusion power
- Perkins' n spectrum
- 12.4 MeV average n energy
- 70% of n's in 14 MeV energy group

Neutrons per MeV



Computational Tools and Model

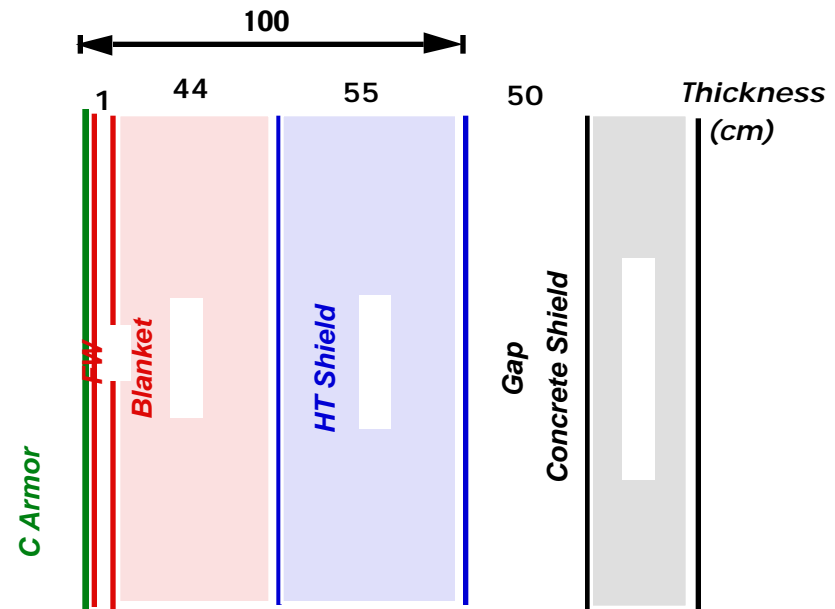
- Spherical model
- Neutron and gamma transport analysis:
 - DANTSYS discrete ordinate code
 - 175 neutron and 42 gamma group structure
 - P_3 - S_8 approximation
 - FENDL-2 IAEA cross section library



Chamber Radial Build

<u>Component</u>	<u>Composition</u>
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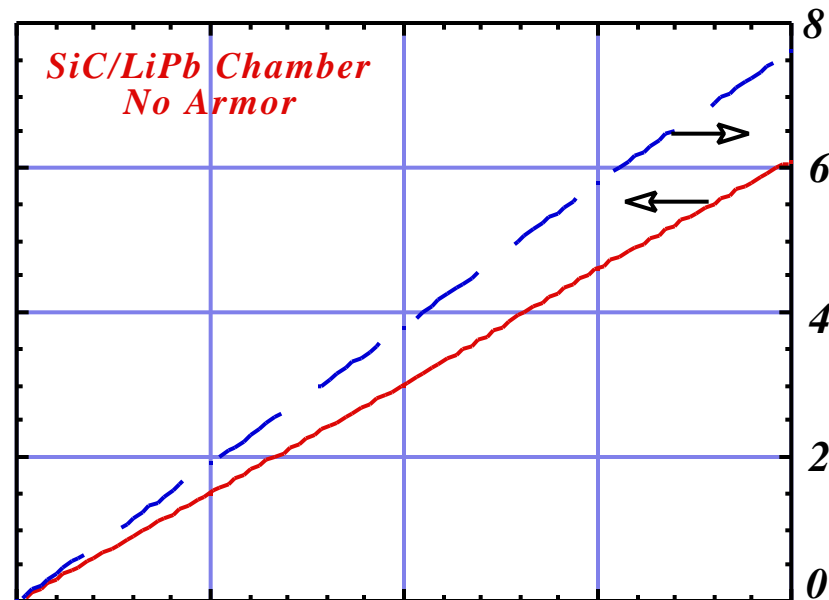
Armor	C
FW	SiC/SiC composites
Blanket	20% SiC, 80% LiPb*
HT shield**	15% SiC, 10% LiPb, 75% B-FS
Concrete shield**	70% concrete, 20% steel, 10% He



* 90% enriched Li

** not optimized

Depending on Thickness, FW Could Capture 15-60 MW of Nuclear Heating



Key Nuclear Parameters

FW radius	<u>4 m</u>	<u>6.5 m</u>
<u>Peak</u> nuclear heating* (W/cm ³)	15	5.7
Neutron wall loading* (MW/m ²)	3.5	1.3
SiC FW lifetime*# (FPY)	6	16
FW EOL fluence (MWy/m ²)	21	21

Total nuclear heating in FW/B/S (MW) ~ 800

Overall TBR > 1.1

FW/B/S M_n 1.15**

* varies as $1/R^2$ with FW radius

based on 3% burnup limit for SiC/SiC composites

** for average $E_n = 12.4$ MeV. Surface heat load not included

