

Engineering of the thermal moderator for a Compact Accelerator driven Neutron Source (CANS)

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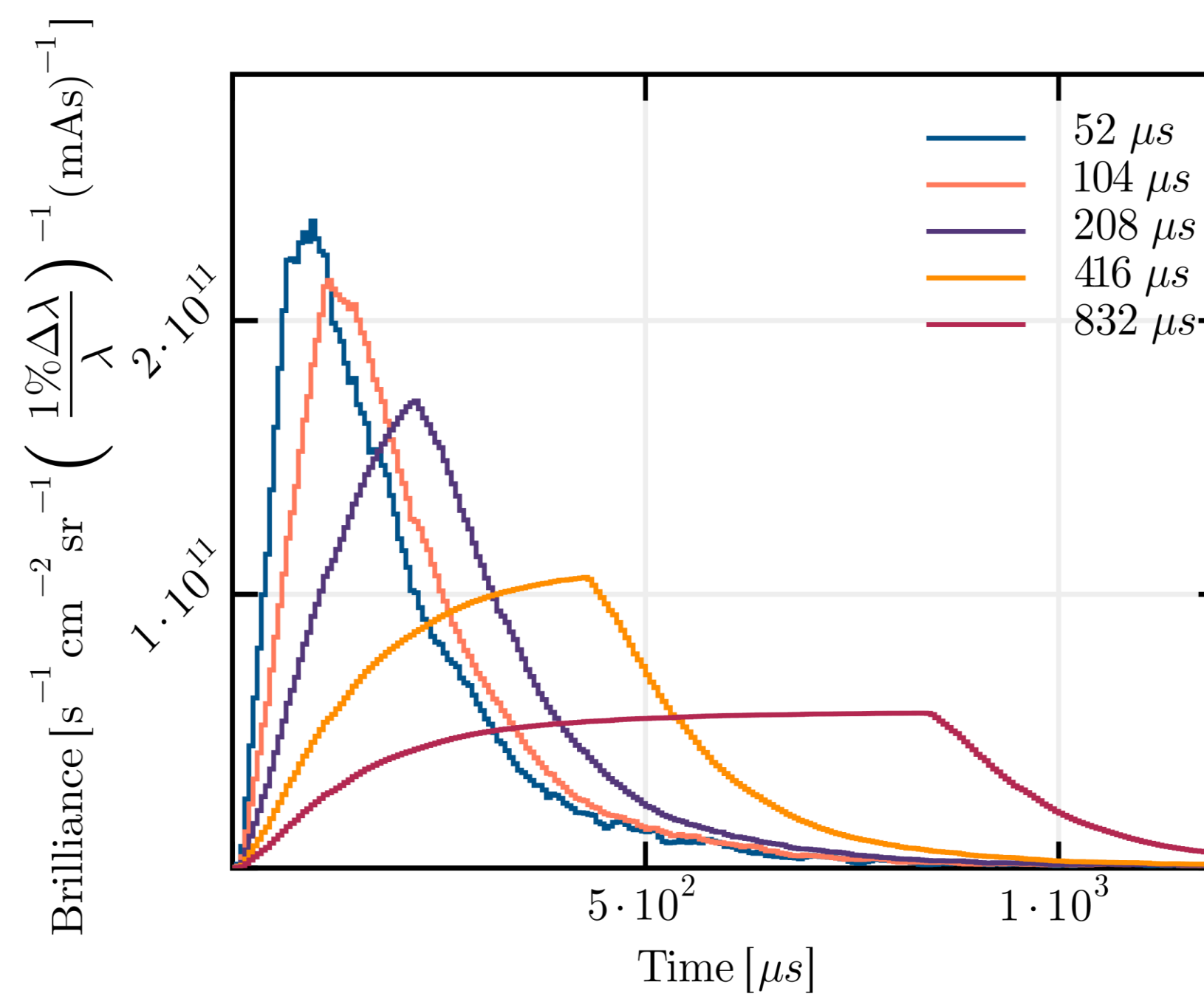
Motivation

Primary neutrons: MeV energy range
Moderator: takes the energy down to the meV range

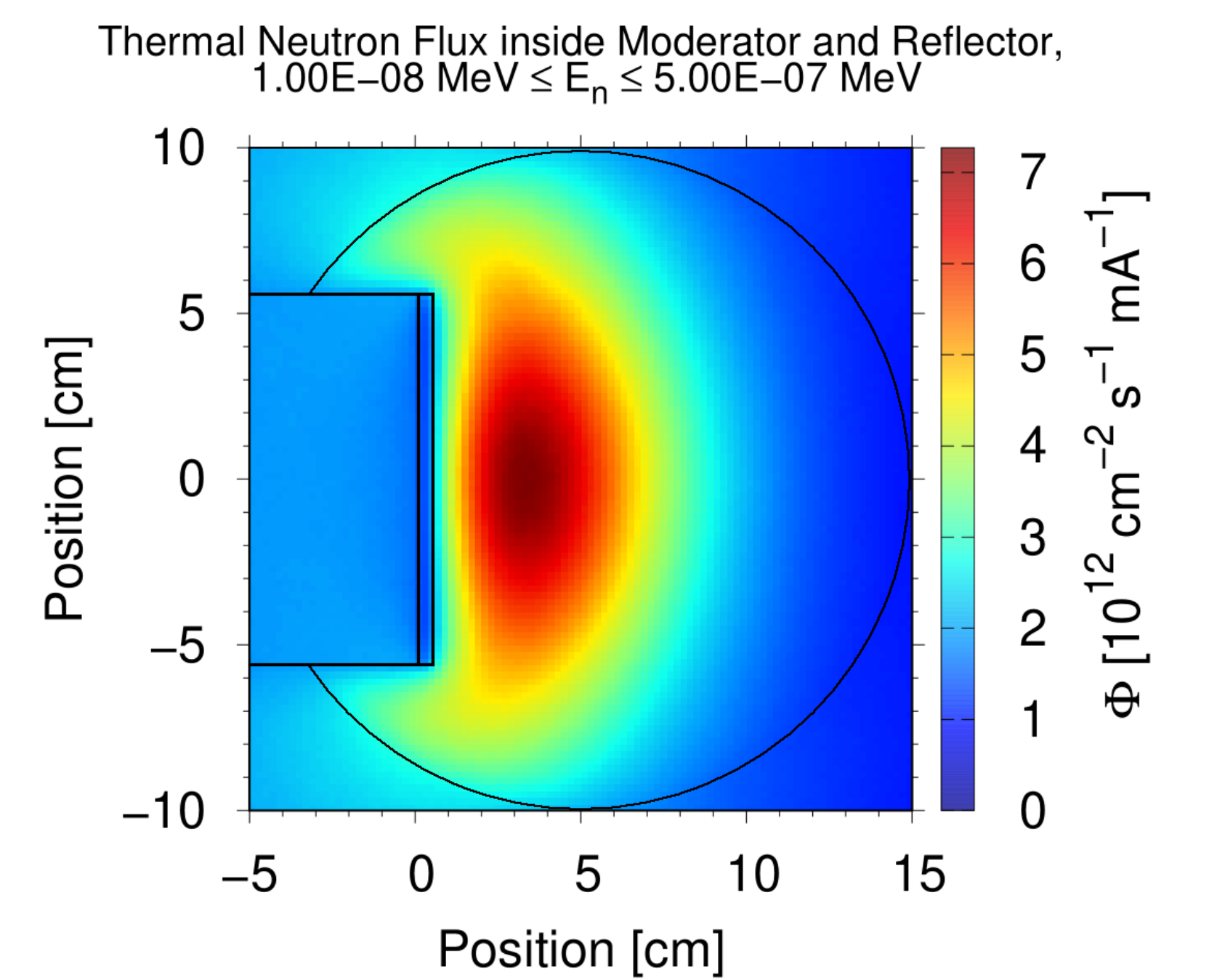
Moderation process needs time → pulse shape is modified
Convolution of proton pulse length and moderation time

Main parameters:

- Diffusion (dilutes the neutron cloud)
- Scattering (moderation + random walk)
- Absorption (reduces intensity)



Neutron pulse shape for different proton pulse lengths



Spatial distribution of the neutron flux in a spherical PE moderator

Moderator material

PE, H₂O/D₂O, diluted PE, slightly borated PE

Variation of scattering and absorption for 50, 200, 800 μs

Geometry

Sphere, one plate, 2 plates (only PE)

Variation of diffusion

for 50, 200, 800 μs

Reflector

Be, Pb, MgO, Absorber
for PE, D₂O/H₂O moderator

Variation of diffusion
and scattering

for 50, 800 μs