



Project X Forum on Spallation Sources • March 20, 2012

Target and Moderator Configurations for NNbar

Yuri Kamyshev/ University of Tennessee
email: kamyshev@utk.edu

3 Configurations + Demonstrator under study

1. Top-Down

low background; possibly highest sensitivity

2. Bottom-Up

background need additional studies

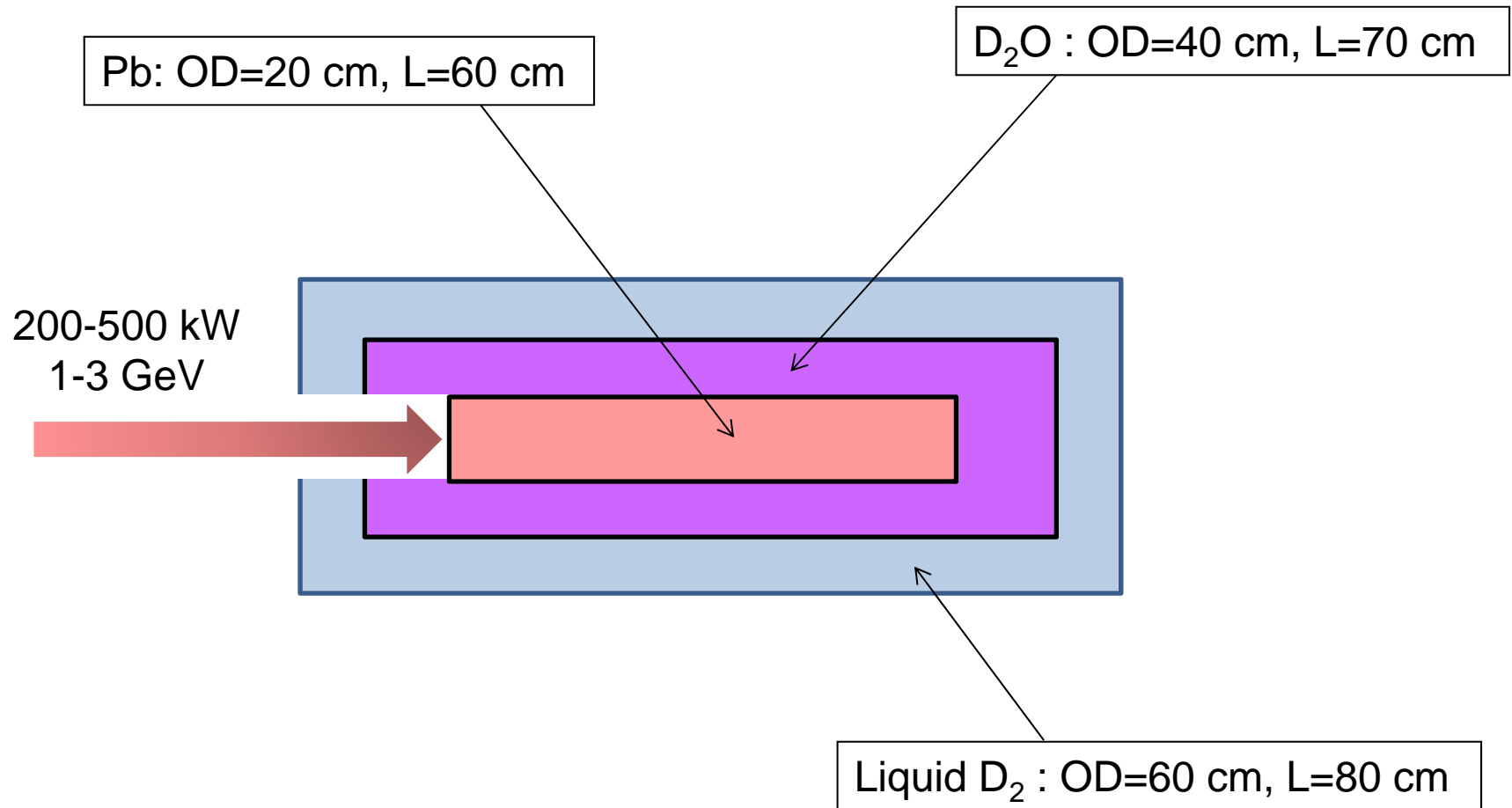
3. Horizontal

possibly easier for implementation

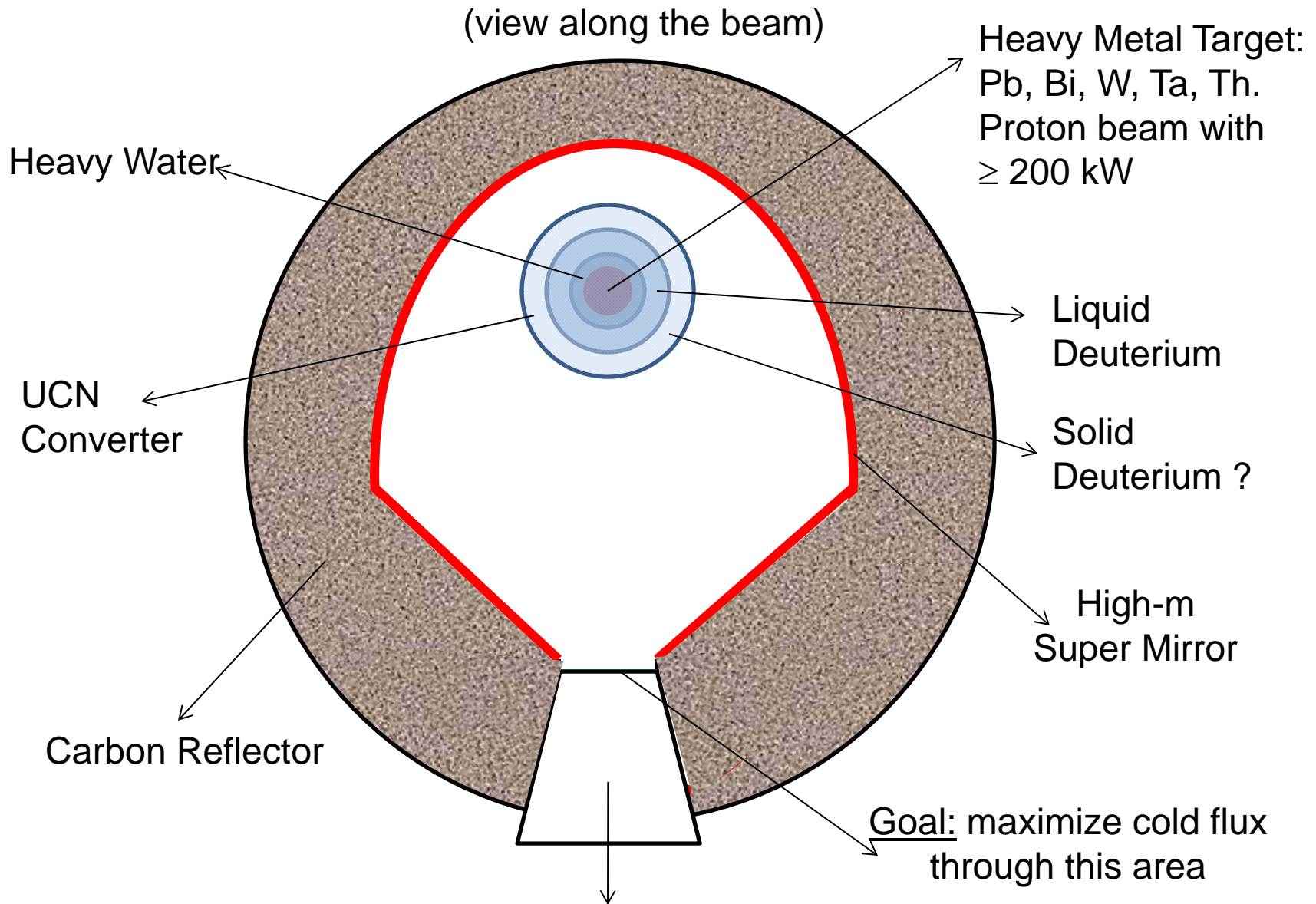
- Demonstrator

not expensive; test some of used technologies;
with respectable sensitivity goal e.g. $\sim 25 \text{ u}$ of ILL

Generic configuration of 4π source target for simulations and optimization

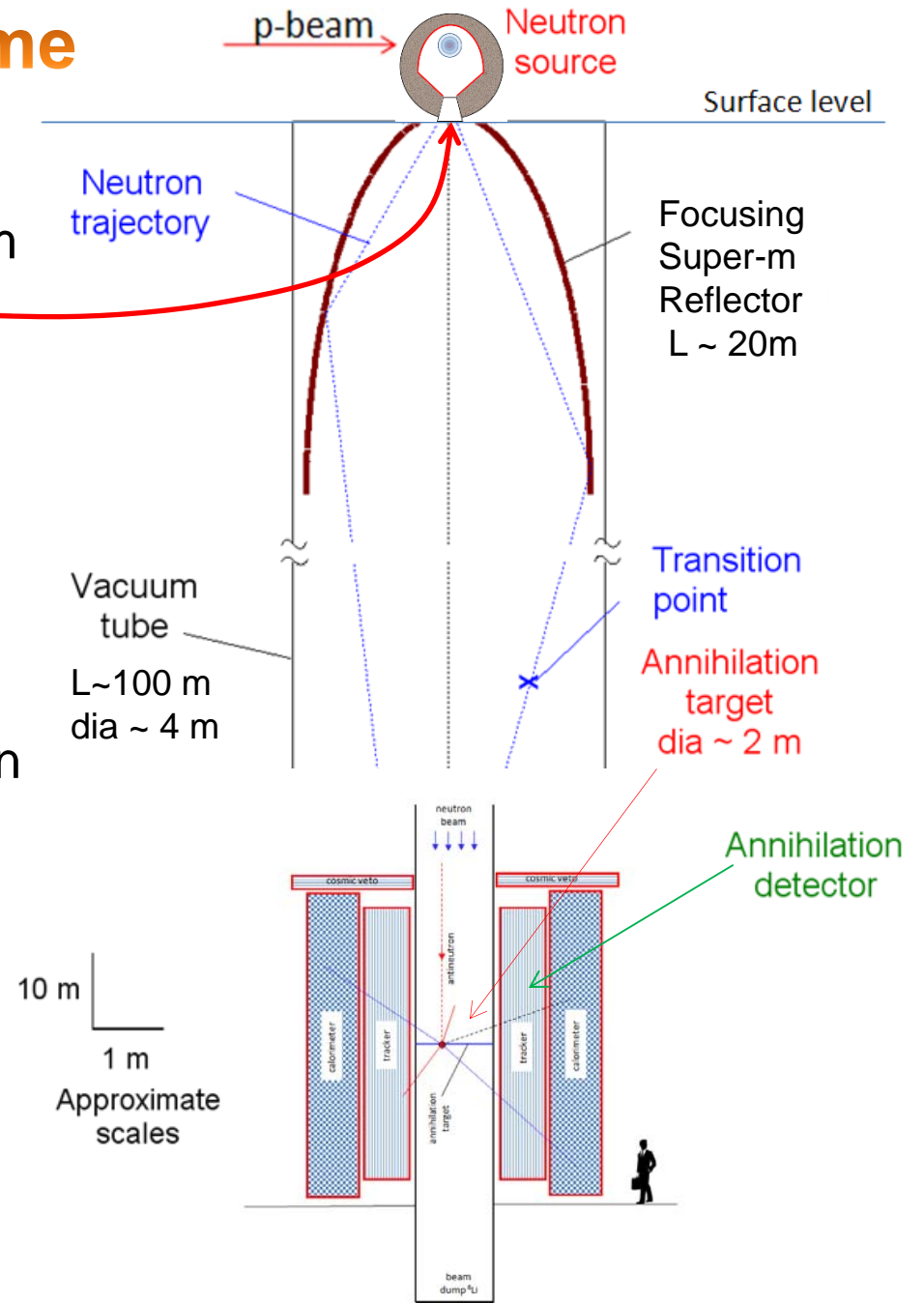


Schematic of spallation target with VCN-UCN converter for Top-Down configuration



Top-Down vertical scheme

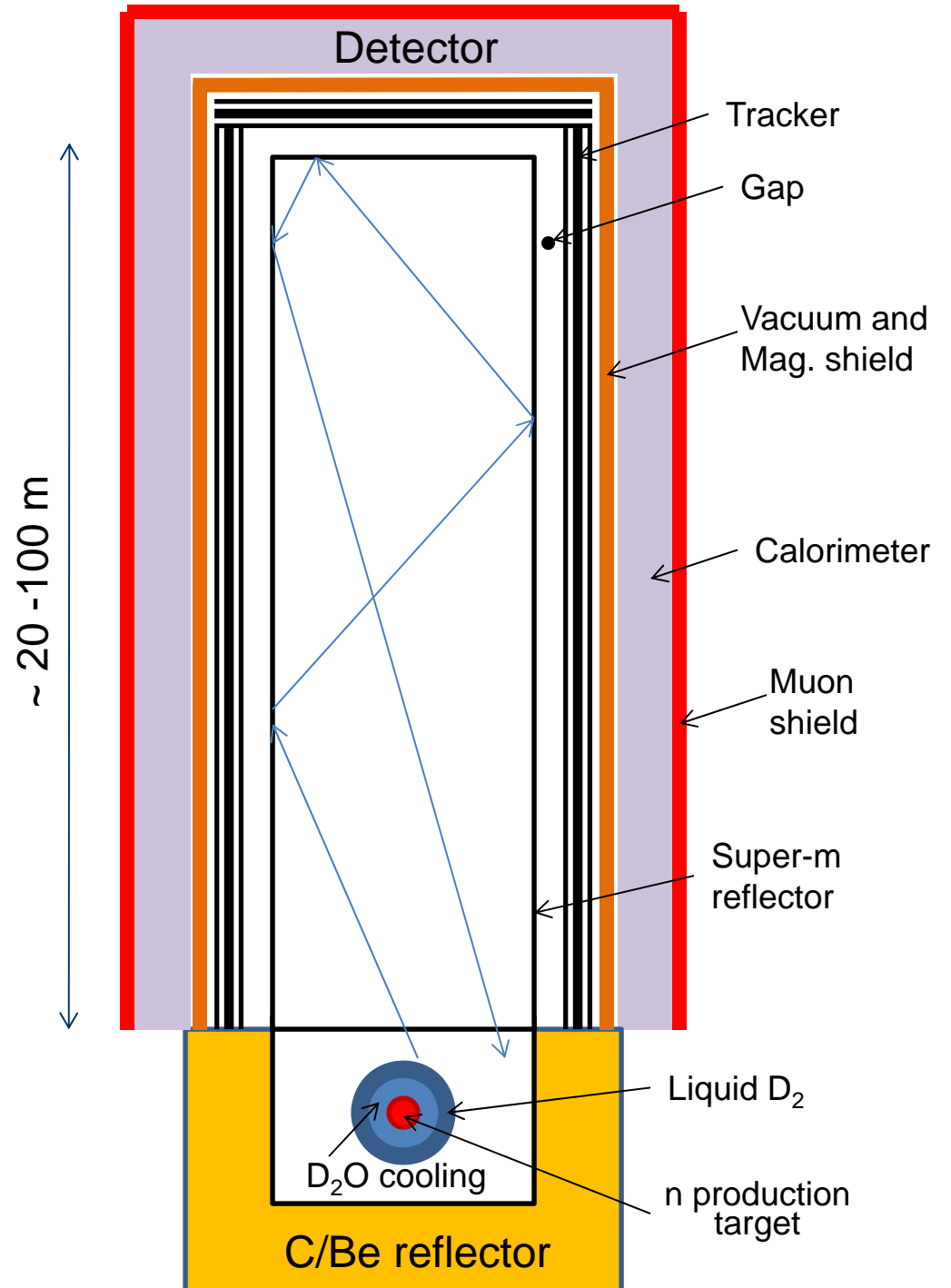
- Need optimized normalized spectrum of cold neutron yield per kW here
- Use $\sim 4\pi$ of cold n production;
- CW or pulsed;
- Max UCN enrichment will be most advantageous
- Try to design to sensitivity of $\sim 5,000 \text{ u}$ and ~ 3 years of operation



Bottom – UP scheme using VCN source

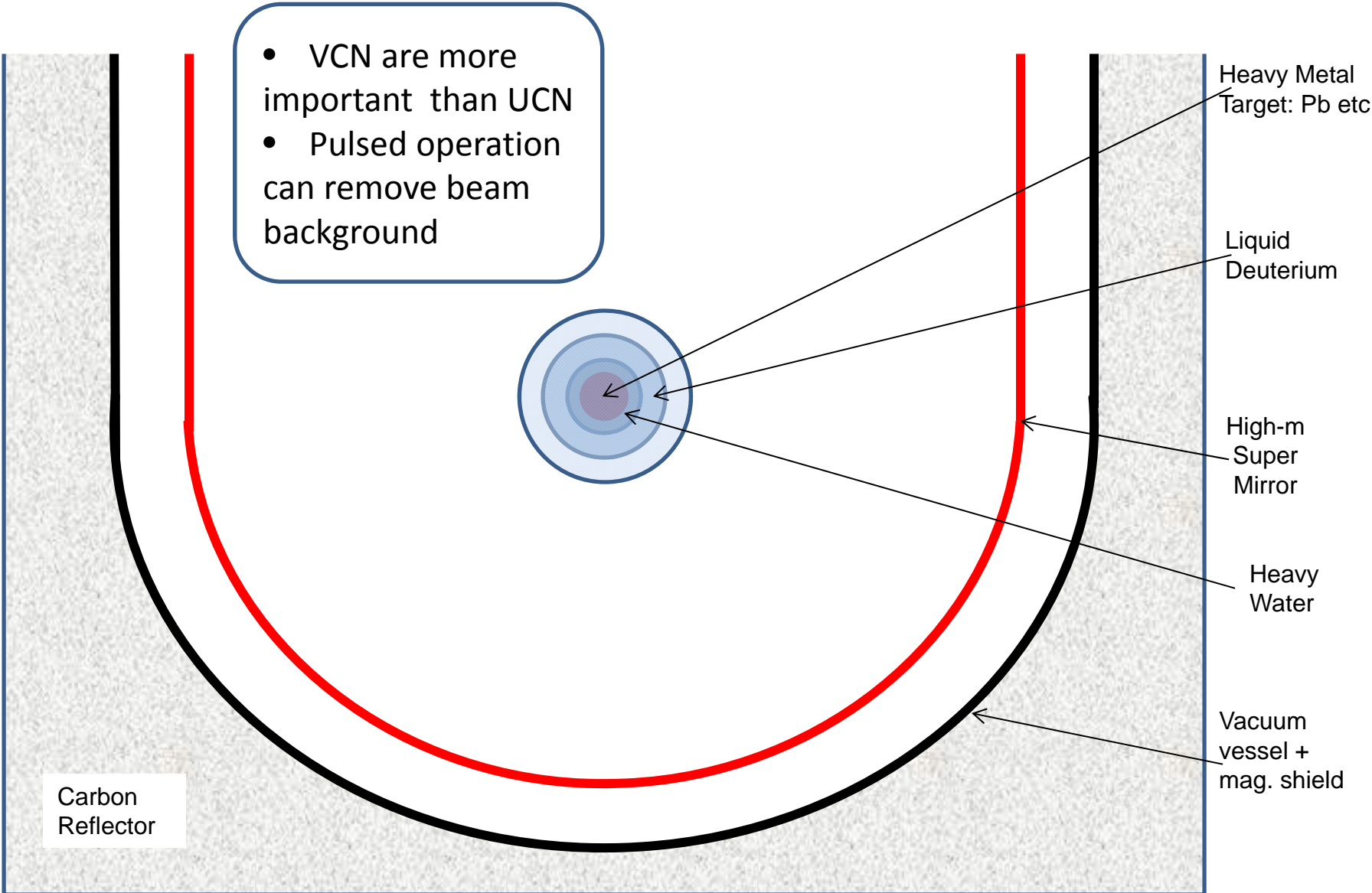
Slow pulse operation with time veto during pulse for detector can help for beam background reduction. E.g. 1 ms pulse with repetition rate of 100 Hz → ~ 1% loss of efficiency

With all-around detector background suppression (e.g. from cosmic) still needs to be demonstrated.

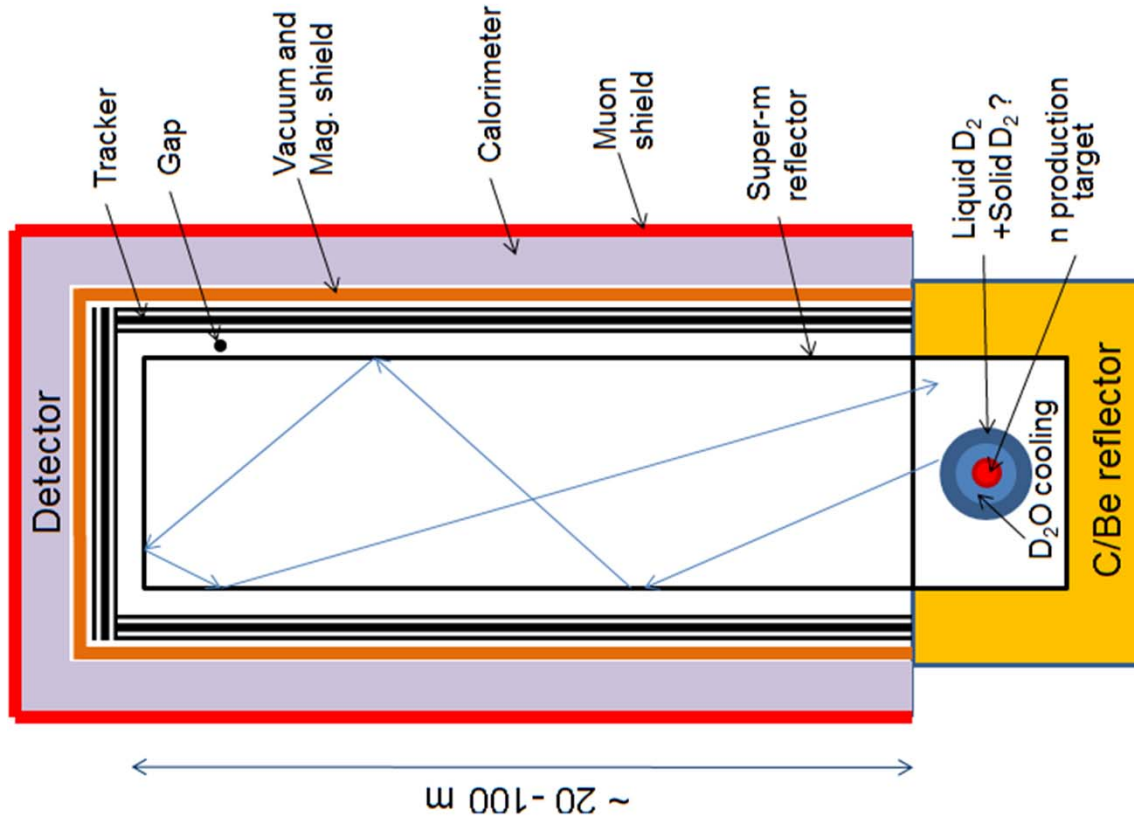


Schematic of spallation target with Bottom-UP VCN converter

(view along the beam)



Horizontal option



Smaller-size Demonstrator Experiment

- Use DT or DD generator with the production $\sim 10^{14} - 10^{15}$ n/s into 4π
- Up-down, bottom-up, and horizontal configurations are possible
seems be most feasible

