Status report

13 May 2021
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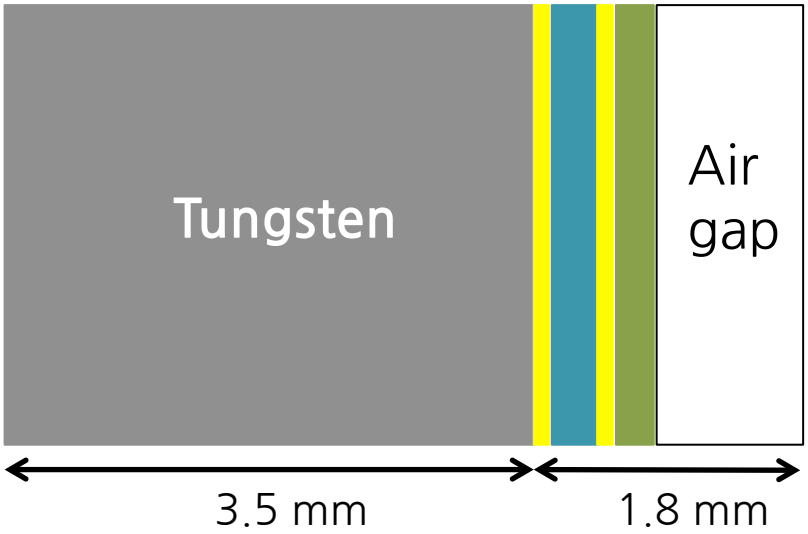
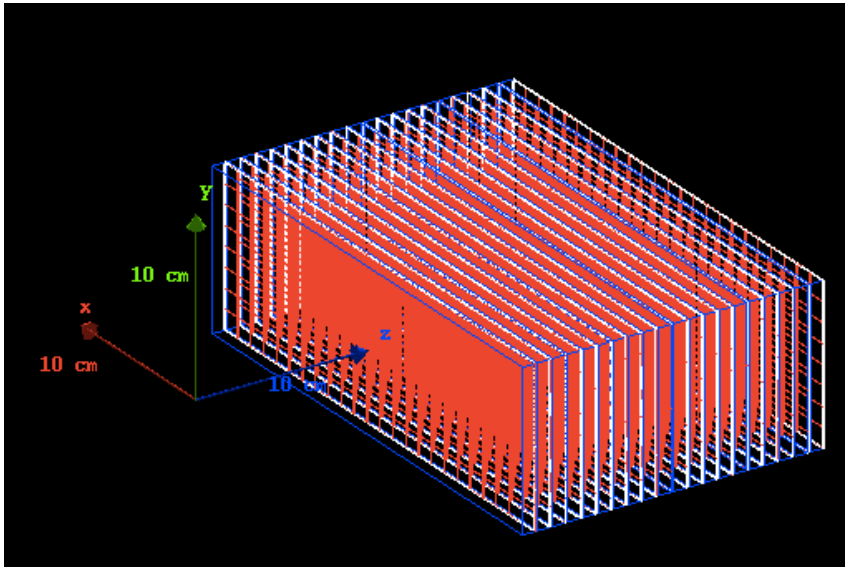
Norbert's simulation geometry

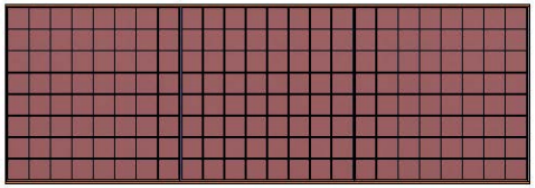
: Glue
: Silicon
: Readout



20 layers



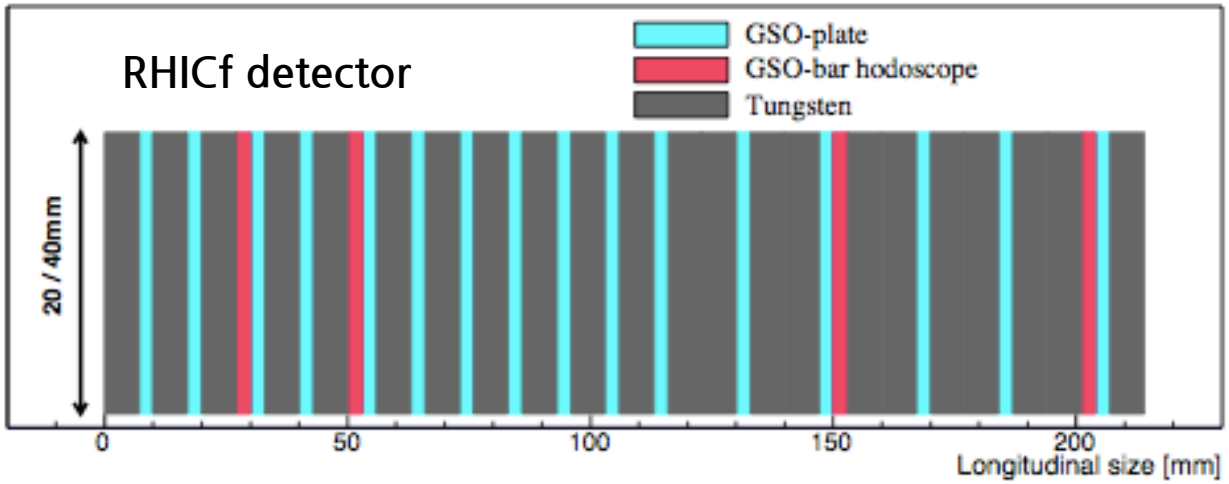
- From the beam's point of view, the whole detector dimension is ~ 26 cm x 9 cm.
- The active area is composed of ~ 11 mm x 11 mm silicon pads.



- Thickness of tungsten is 3.5 mm.

RHICf detector geometry

44 X_0, 1.6 λ_{int}

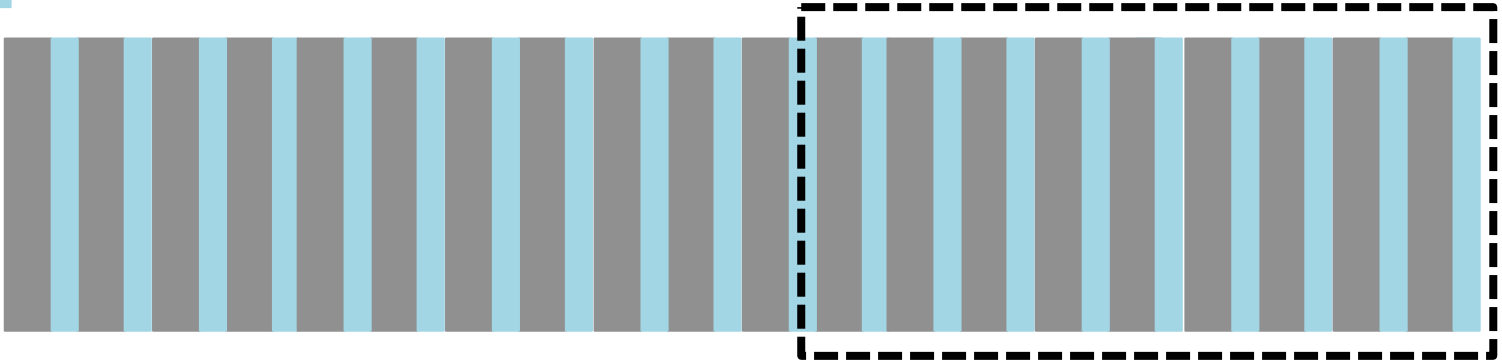


- RHICf detector consists of 17 (16) layers of tungsten, 16 layers of GSO-plate for energy measurement, and 4 layers of GSO-bar hodoscope.
- Thickness of thinner forward tungsten is 7 mm and thicker backward one is 14 mm.
- It has enough radiation length for photon but insufficient nuclear length for neutron.

Simulation setup

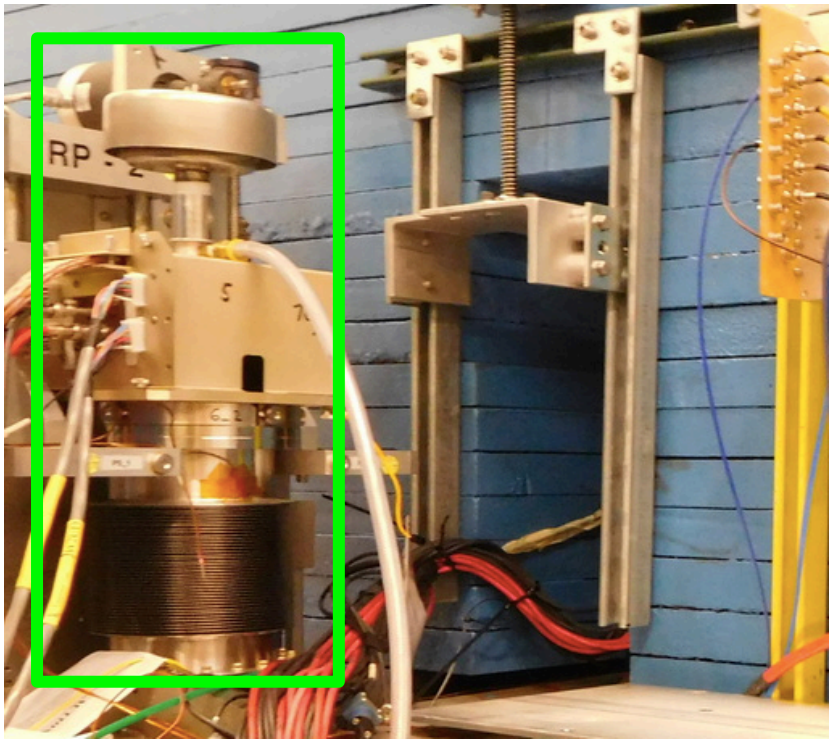
: Tungsten

: Glue + silicon + glue + readout



- The whole detector dimension was changed to RHICf-II size as 8 cm x 18 cm.
- The first 11 layers of tungsten + silicon pad followed the RHICf detector geometry.
- Neutron resolution depending on the number of latter tungsten and its thickness was studied (n times weighted for the energy deposit of n times thicker tungsten).
- If the number of latter tungsten is five and its thickness is 14 mm, the tungsten geometry is as same as the RHICf detector.

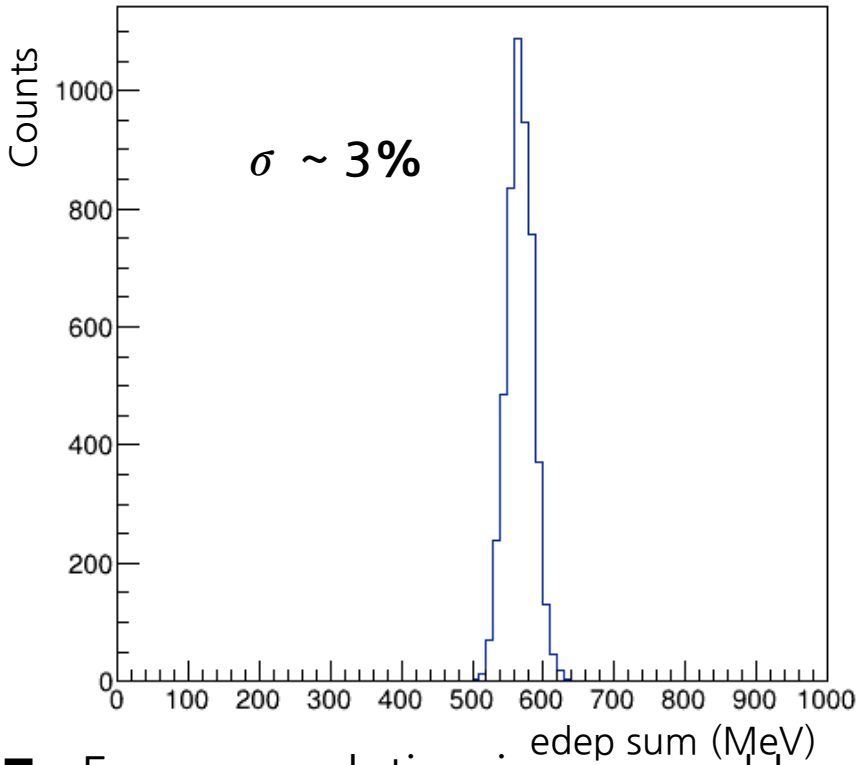
Detector size limitation

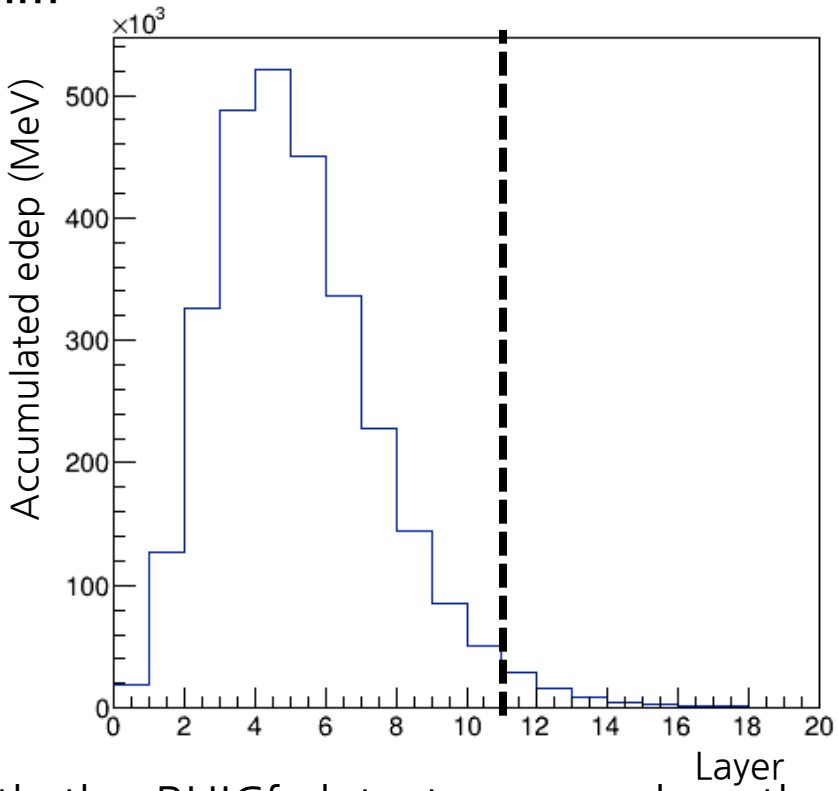


- There is geometrical limitation by Roman pot and ZDC for longitudinal direction. The hole will make vertical limitation.
- Looking into the log note and asking collaborators yet..

Energy deposit of 100 GeV photon

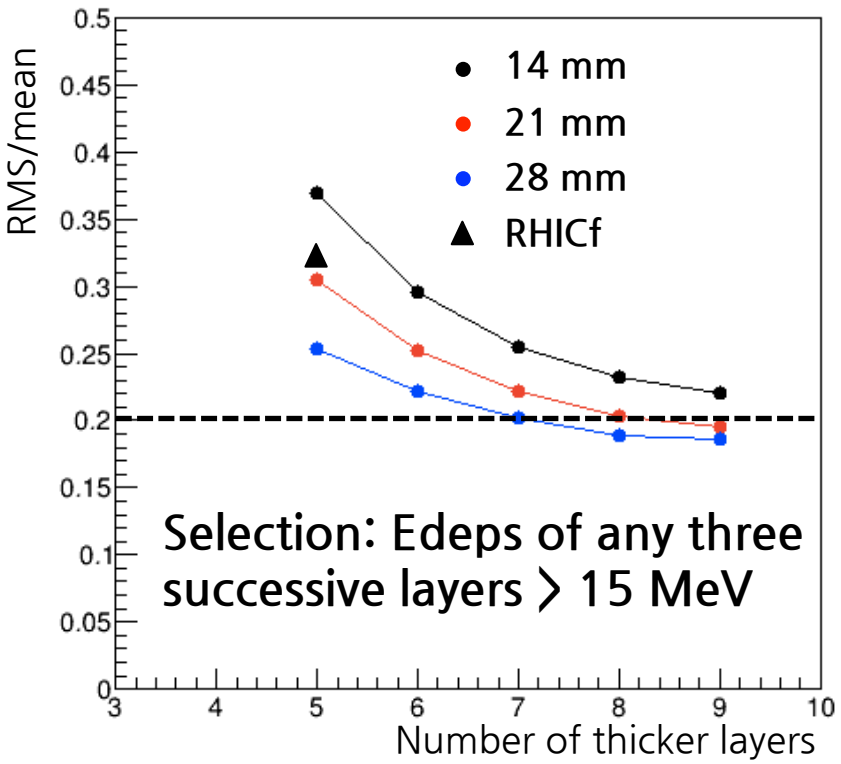
of tungsten = 9, thickness = 7 mm

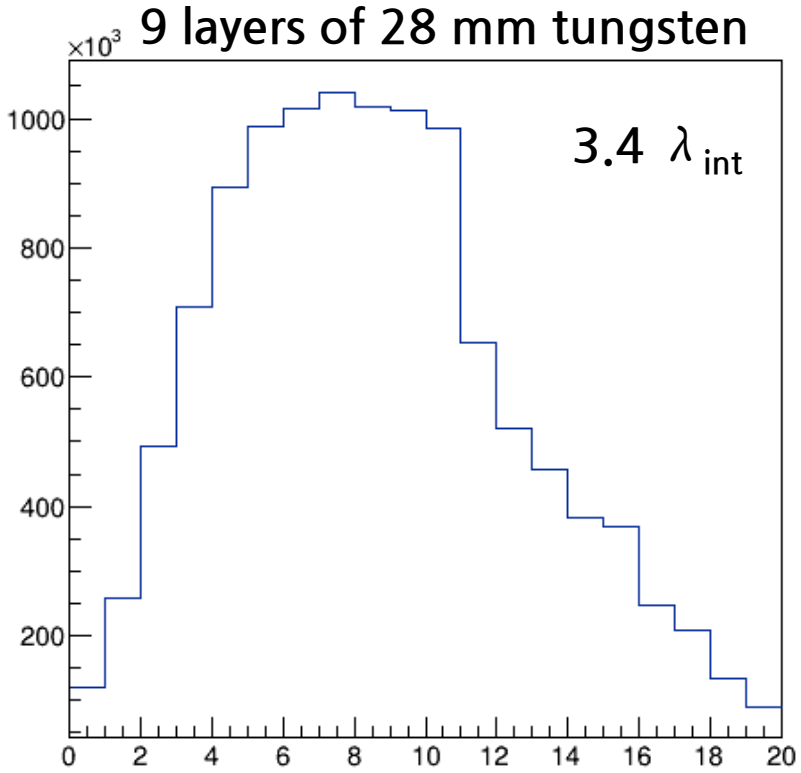




- Energy resolution is comparable with the RHICf detector one when the photon hit the center of the detector.
- EM shower stops its development at the middle of the detector.
- Energy deposit sum is 3~4 times smaller than RHICf due to thinner silicon thickness.

Results for 100 GeV neutron





- With longer λ_{int}, the RMS/mean approaches ~0.2.
- With 3.4 λ_{int}, most of the hadronic shower by the triggered neutron is absorbed in the detector.
- From 100 GeV neutron's point of view, the most effective detector length should provide ~15% of neutron energy resolution.