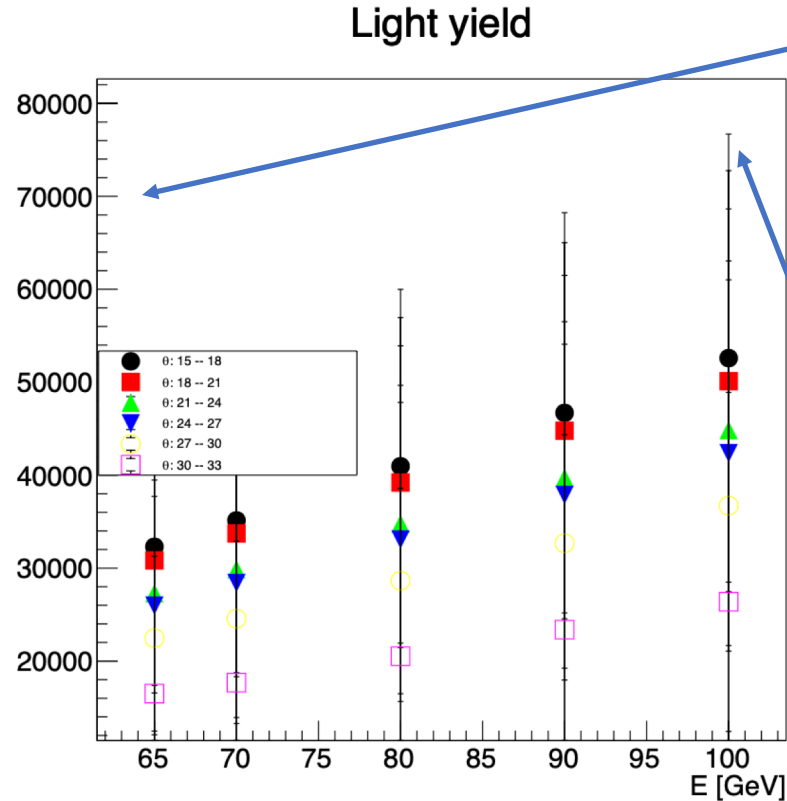
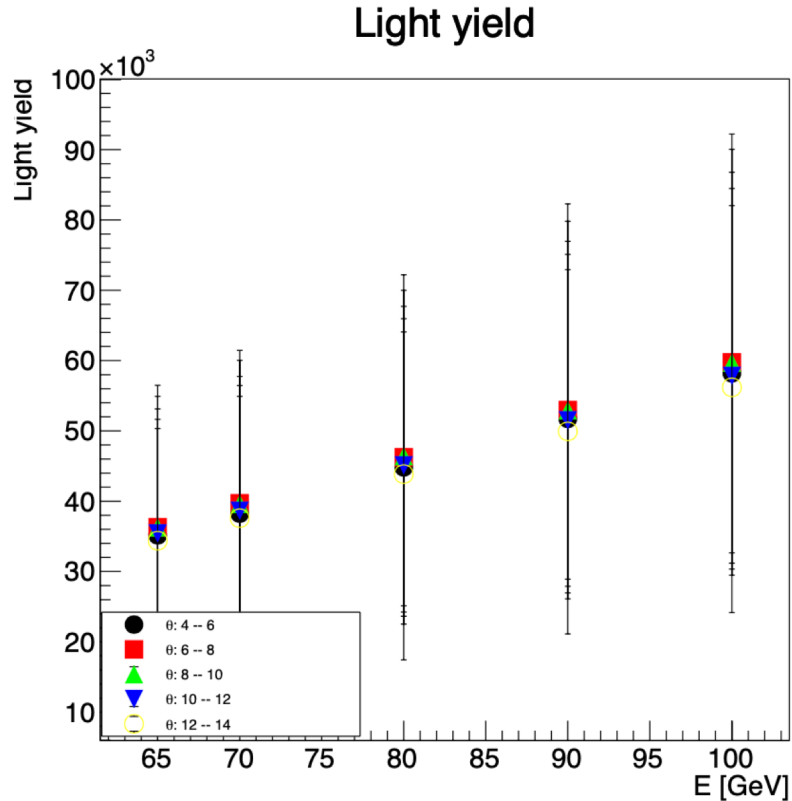


Q1 - What is the dynamic range one needs to cover?

ePIC full simulations by Zhongling Ji presented at Calorimetry WG on Feb 15, 2023

<https://indico.bnl.gov/event/18437/contributions/73244/attachments/46022/77786/main.pdf>



'Light Yield' on y axis means number of fired pixels with assumption of LY at 1000 pixels/GeV.

Shown mean and min/max for all 'rapidity' bins for fECAI.

Max. sets requirement on pixel size.

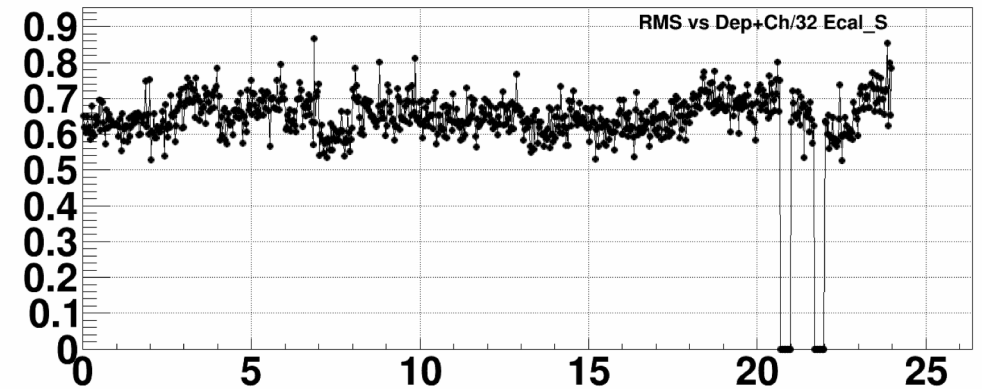
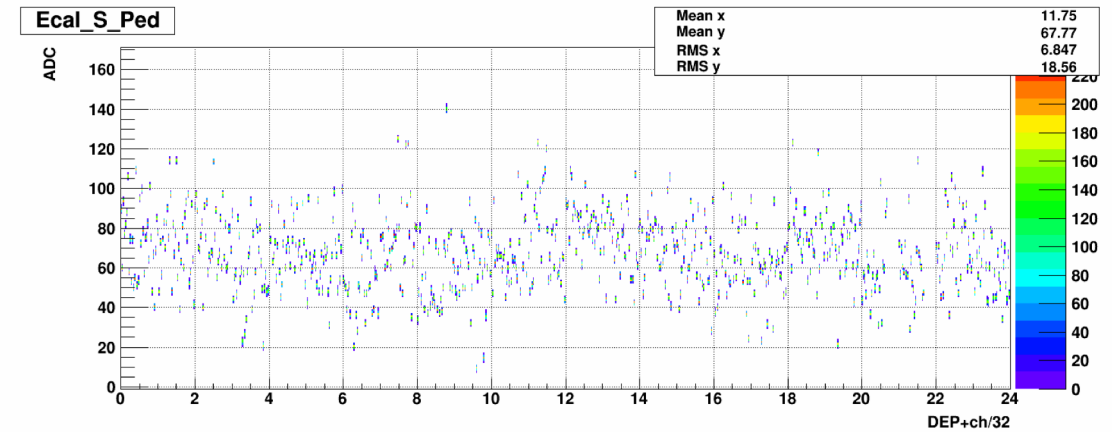
Conclusion. For four 6x6 mm SiPMs per tower for fECal pixel size should be in ~ 20 μm size (15 μm will work fine).

Q2- What is the impact of radiation damage of the SiPMs on you system.

Increase in a dark current -> increase in noise.

Based on FCS results (n fluxes similar to high lumi EIC) and projections for achievable LY (eRD106) for fECal we expect noise will be somewhat similar to FCS at ~ 3 MeV at highest rapidities. (That has to be measured with the beam, eRD106 test run at FNAL).

3 MeV FCS noise after Run 22 at RHIC



Q3. What specs have you already determined and how? What needs still be determined.

Pixel size 15 um, active area for a single sensor 6 x6 mm, four SiPMs per tower.
(ePIC simulations, past EIC R&D, STAR FCS readout)

Q4. How do your SiPM specs impact the readout electronics, especially the FEEs

Impact will be small. As verified by Gerard V. with four 6x6 SiPMs connected to FCS FEE. Some shaping may need to be tweaked.

Range of leakage currents to be handled by voltage regulators need to be verified, should not be an issue.