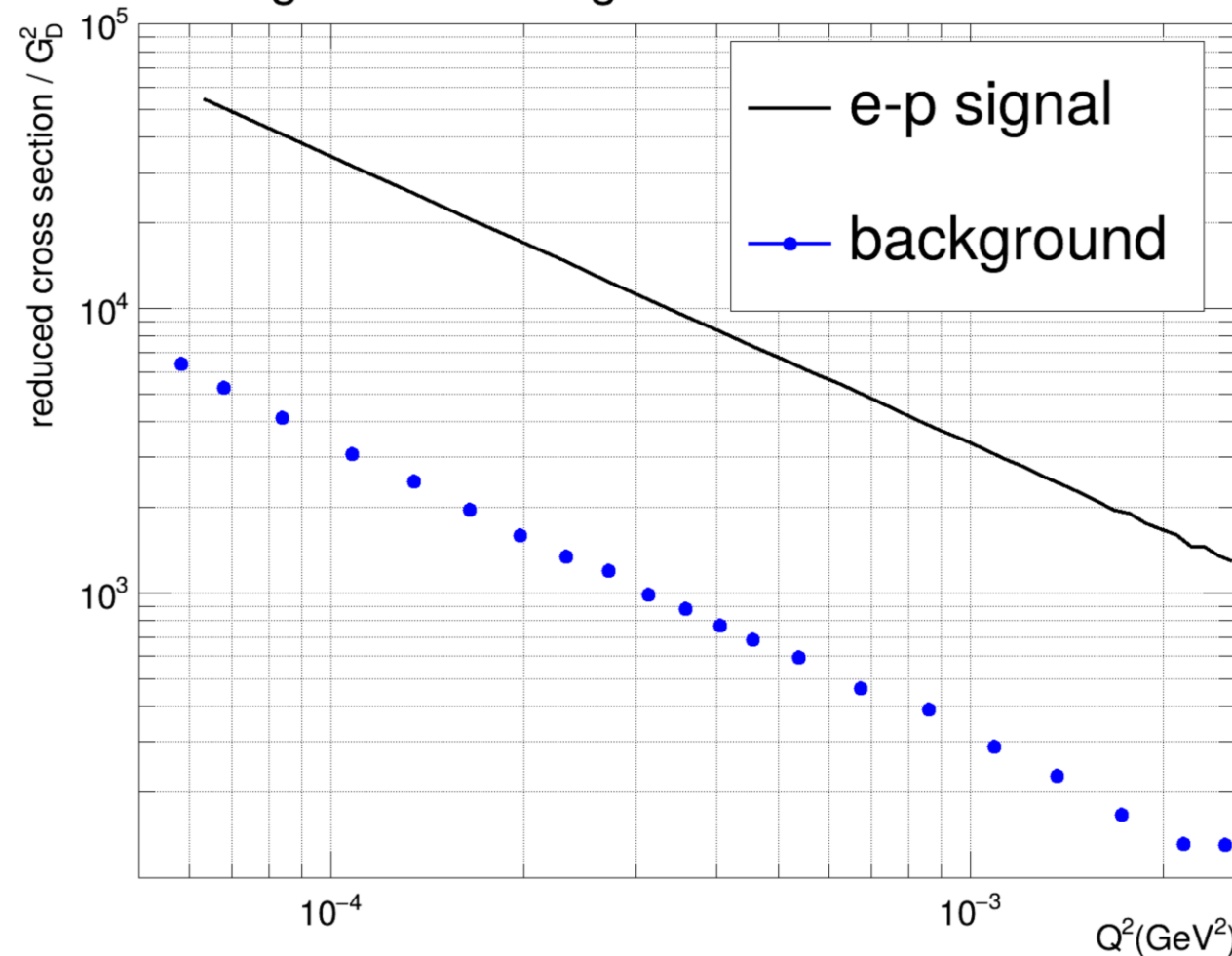


ERR Charge – PRad-II #2 Recommendation

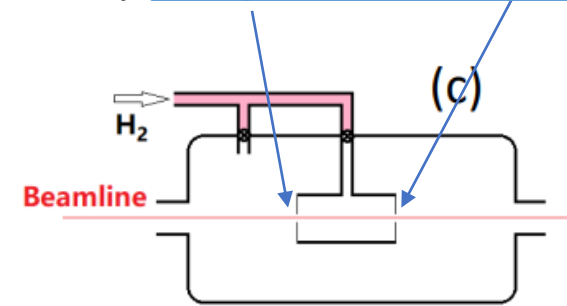
Recommendation:↵

A plot of reduced cross section vs Q^2 showing signal events and expected background events would help everyone see the potential for the background correction to introduce systematic errors into the radius determination. ↵

signal and background 0.7GeV at 20nA



- Result based on beam halo level of 10^{-5} , dominated by target cell windows



- ~9% total background to signal ratio at 0.7GeV, no obvious angle dependence.

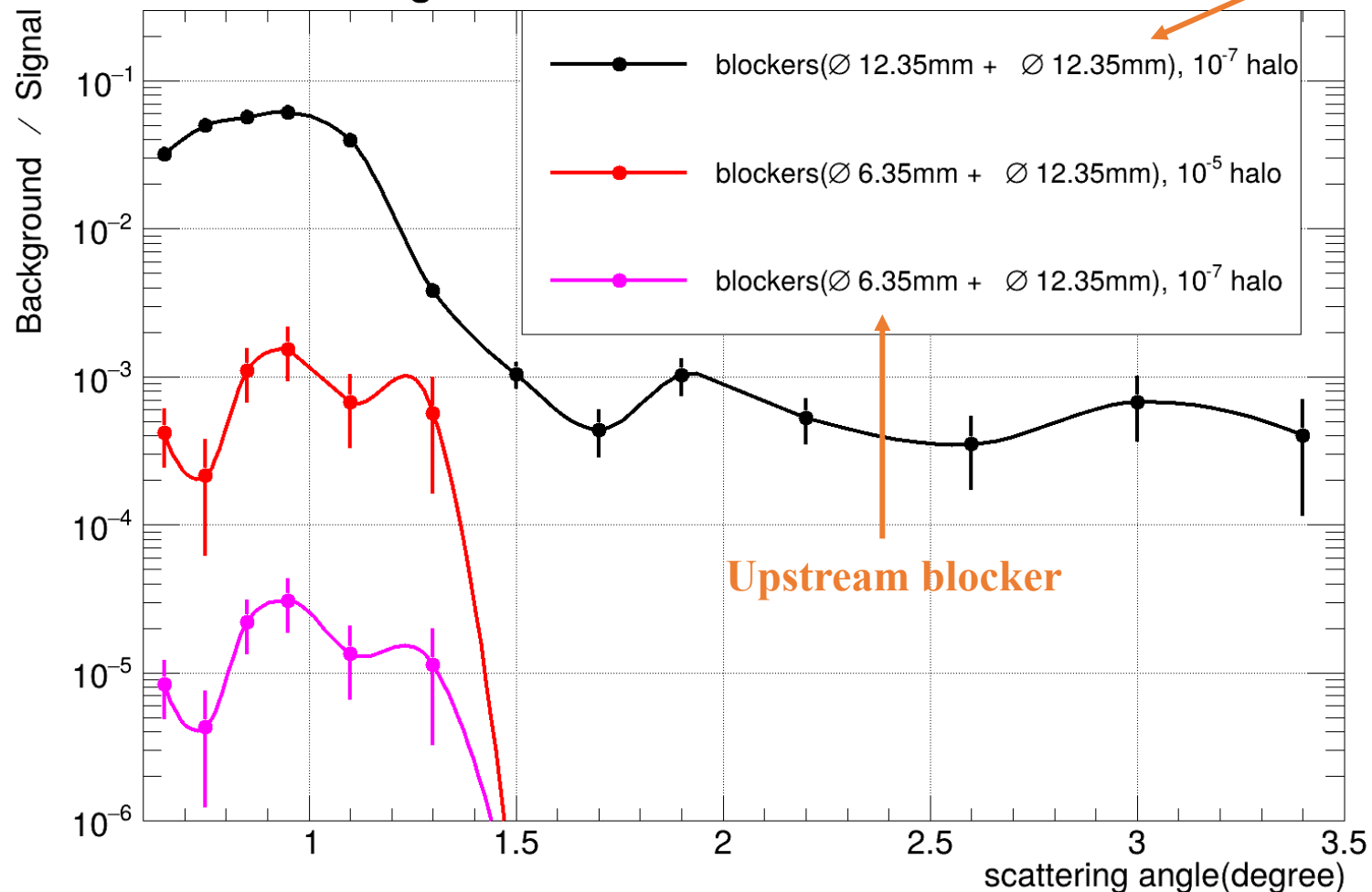
ERR Charge – PRad-II #4 Recommendation

The beam background contributions and associated uncertainties presented at the review were based on the beam halo level of **10^{-7}** , consistent with the original PAC proposal.

On the other hand, the beam halo requirements were modified to **10^{-5}** during the review.

The beam background contributions and the corresponding uncertainties should be evaluated for beam halo levels of **10^{-5}** . Alternatively, the capability to measure the beam halo down to the level of **10^{-7}** should be demonstrated.[↵]

Background from Halo Blocker at 0.7GeV



Black curve:

- Bigger upstream tagger collimator
- 10^{-7} halo level,
- 4% background to signal ratio at low angles.

Red curve:

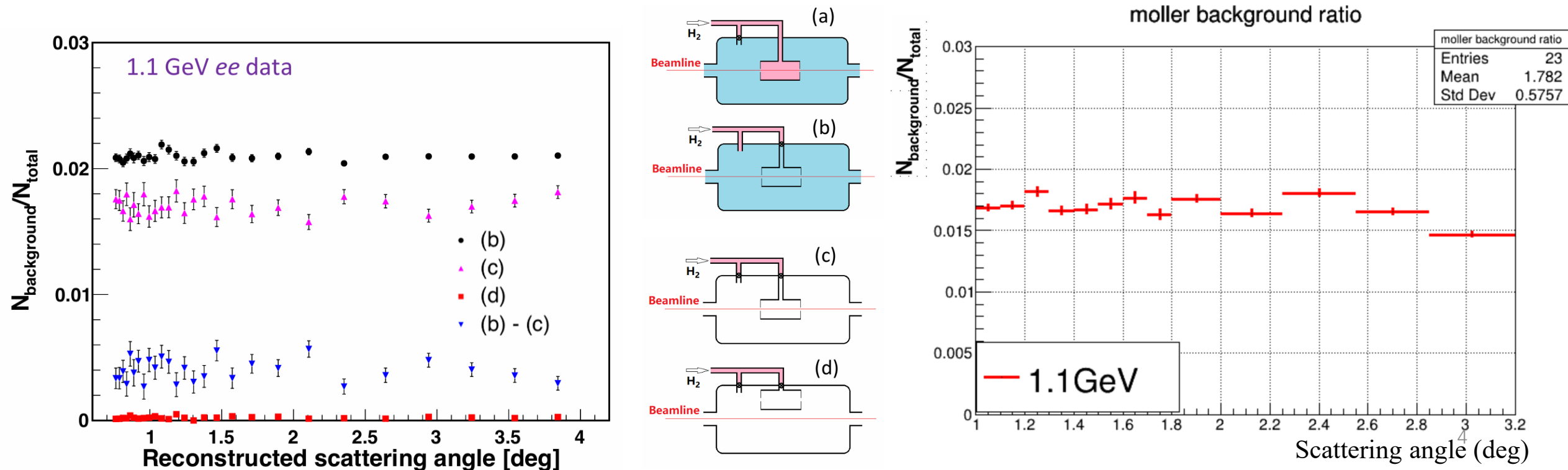
- **Smaller** upstream tagger collimator
- 10^{-5} halo level.
- Background ratio reduced to **0.1%** level at low angles.

Magenta curve:

- Smaller upstream tagger collimator
- 10^{-7} halo level
- background ratio 0.002%.

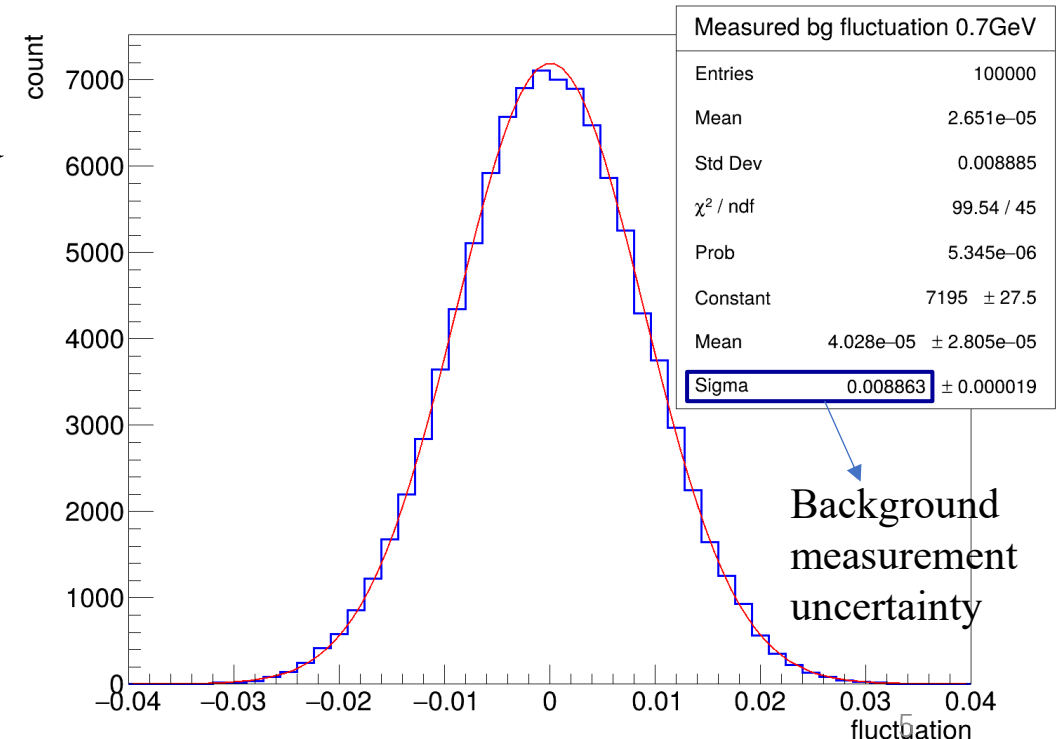
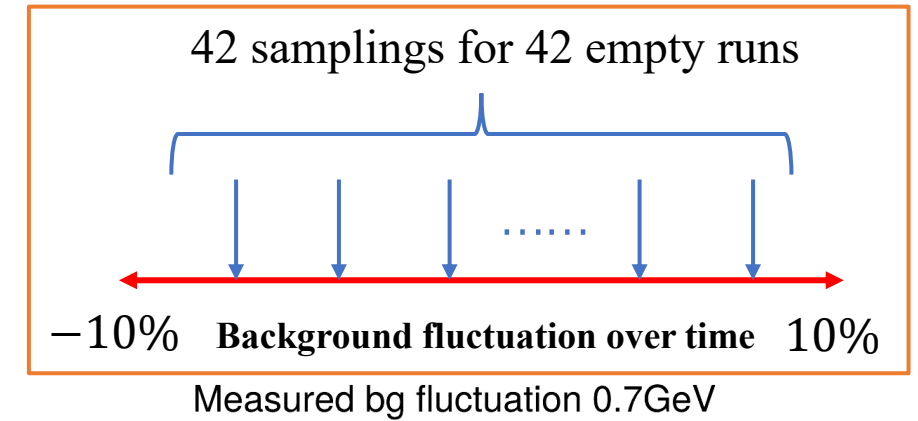
Backup

- In PRad data, moller background ratio is $\sim 1.7\%$ (c – d, coming from halo hit on target cell win.)
- Simulation based on halo level of 10^{-5} , moller background ratio is also around 1.7%, same with PRad data
- As the simulation match the PRad data very well, could think PRad had a halo level of 10^{-5}



Halo Background Subtraction Uncertainty

- Assume 1 empty target run after every 3 production runs(similar with PRad)
- 7 PAC days for 0.7GeV, in total 126 production runs and 42 empty target runs.
- Assume halo $\pm 10\%$ fluctuation over time (number from PRad data), carry out 42 samplings through out the total period to get the average syst. uncertainty from time variation.
- The uncertainty of background measurement due to background fluctuation is **0.89%**. For $\sim 10\%$ backgroud ratio, capable to keep **0.1%** systematic uncertainty of background subtraction.



Halo Background Subtraction Uncertainty

- **1 empty target run after every 3 production runs**
- 10% background ratio in each bin
- The projected syst. uncertainty of subtraction due to background statistics

