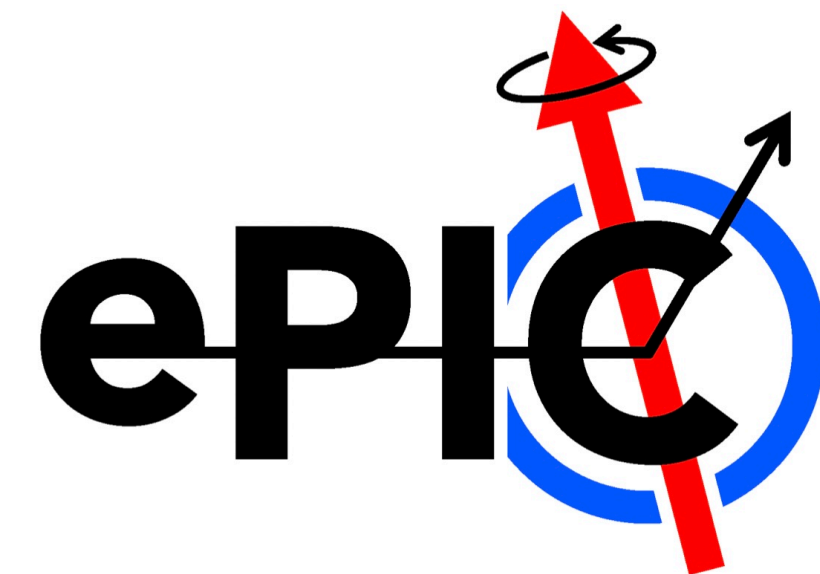
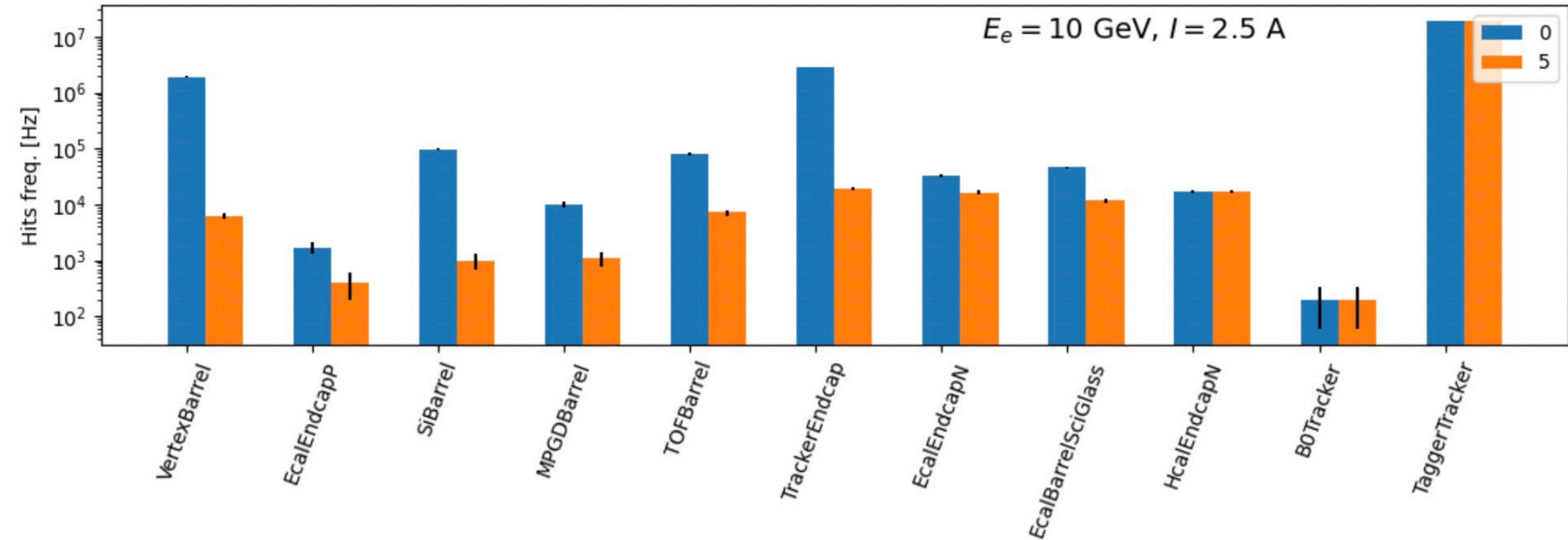


SR Background Studies: Energy Thresholds

Reynier Cruz-Torres
Lawrence Berkeley National Laboratory
January 18th, 2023



To recap



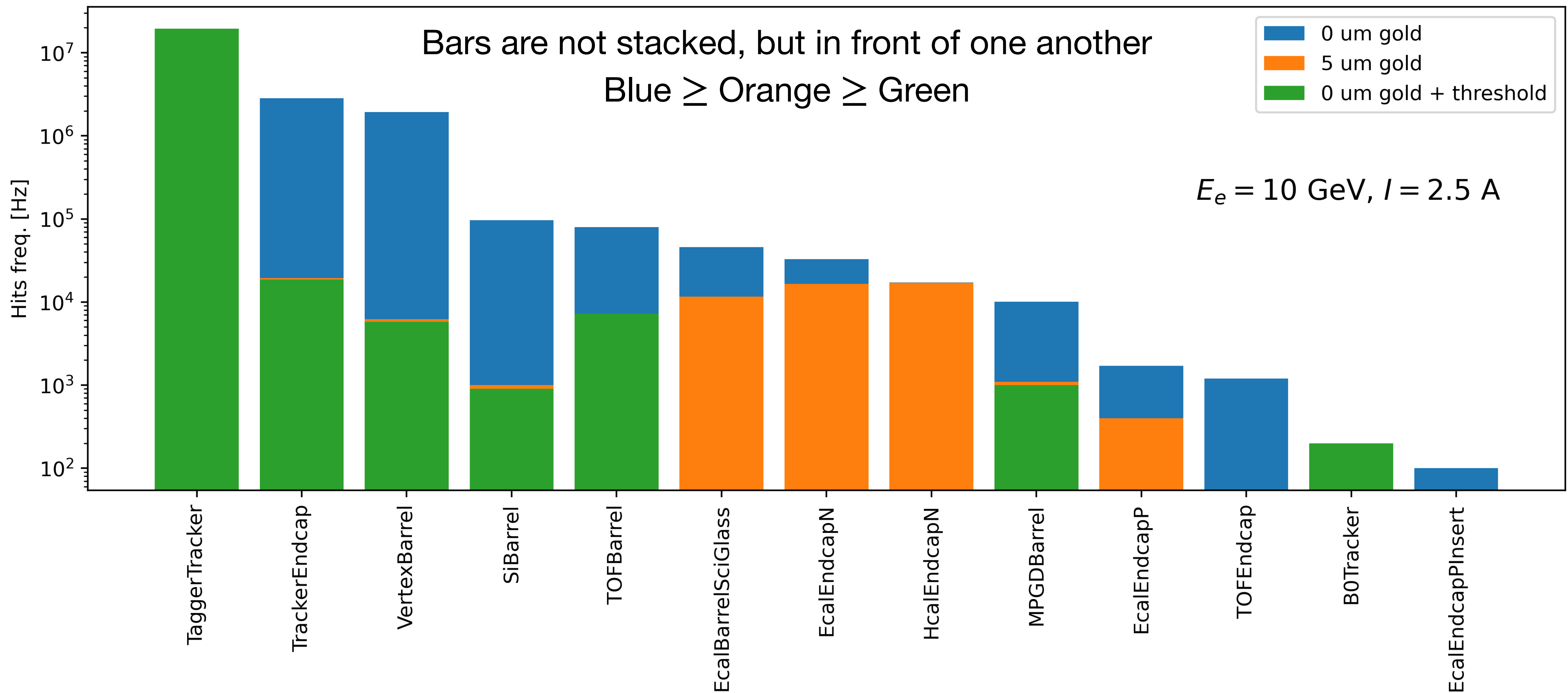
Previous studies did not include subdetector energy thresholds

Energy thresholds from the ATHENA era

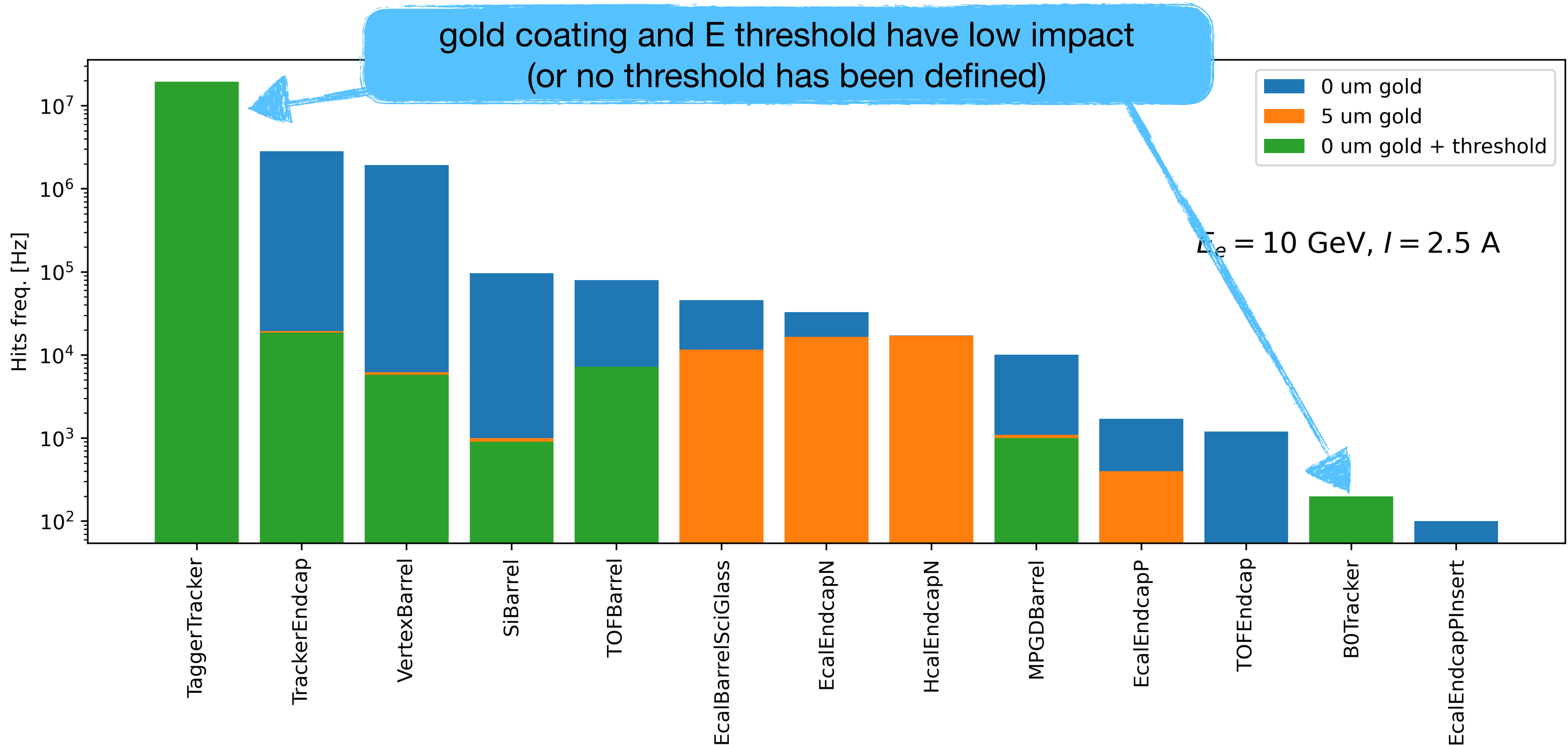
	readout	Threshold
VertexBarrel	0.010mm*0.010mm	0.4keV
DIRCBar	3.0mm*3.0mm	
ERICH	3.2mm*3.2mm	divided by 3
EcalEndcapP	1 fiber (20.5mm*20.5mm)	5 MeV
DRICH	3.2mm*3.2mm	divided by 3
TrackerBarrel	0.010mm*0.010mm	0.4 keV
TrackerEndcap	0.010mm*0.010mm	0.4 keV
MPGDTrackerBarrel	0.52mm*0.52mm	0.2 keV
GEMTrackerEndcap	0.17mm*0.87mm	0.2 keV
EcalEndcapN	1 fiber (20.5mm*20.5mm)	2.5 MeV
EcalBarrel	0.5mm*0.5mm	0.4 keV
B0Preshower		
EcalBarrelScFi	1 fiber	2.5 MeV
HcalBarrel	100.0mm*100.0mm	0.1 MeV
HcalEndcapP	100.0mm*100.0mm	300 MeV
HcalEndcapN	100.0mm*100.0mm	0.1 MeV

Table copied from slide 10 [here](#)

New results including energy thresholds

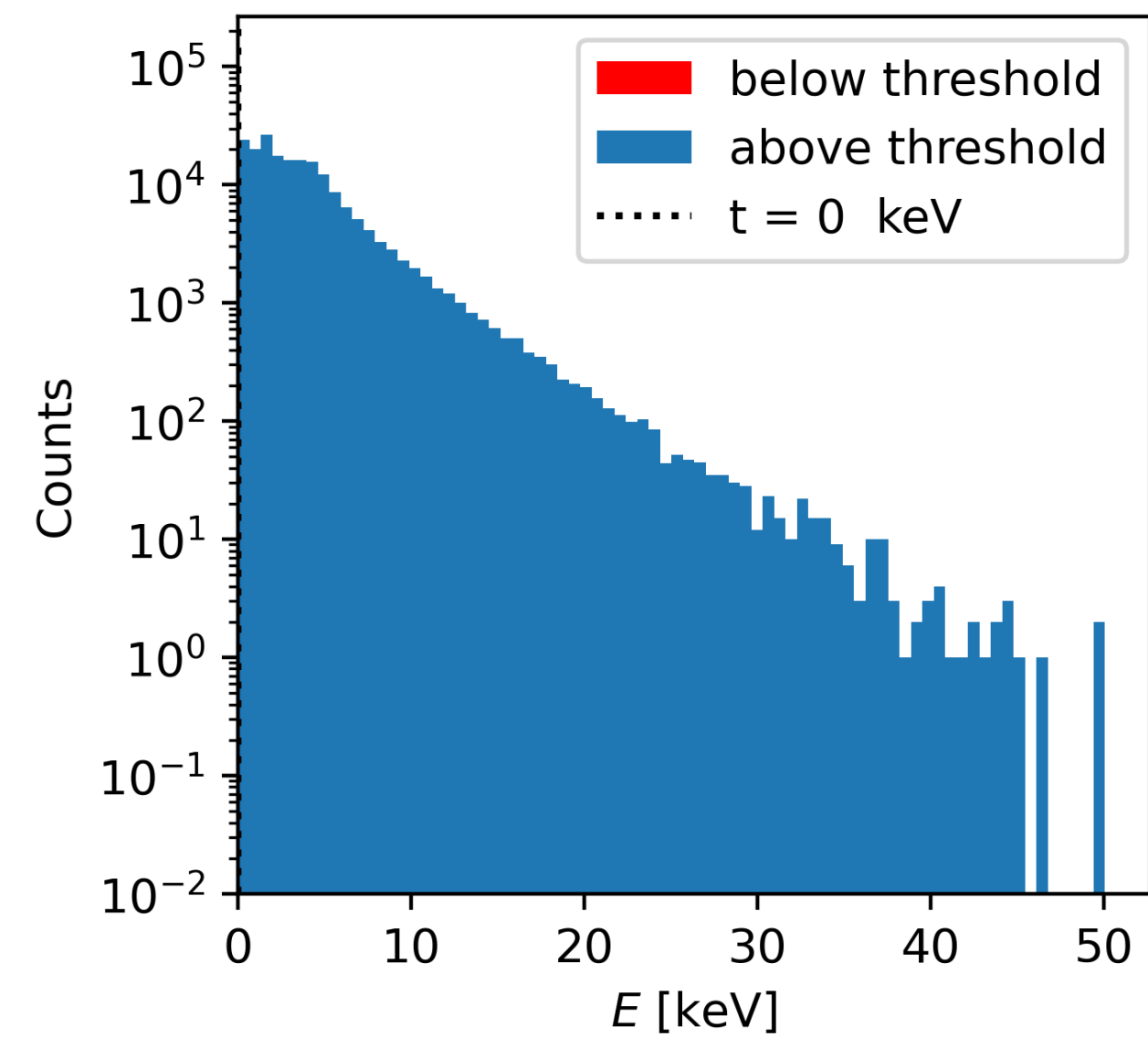
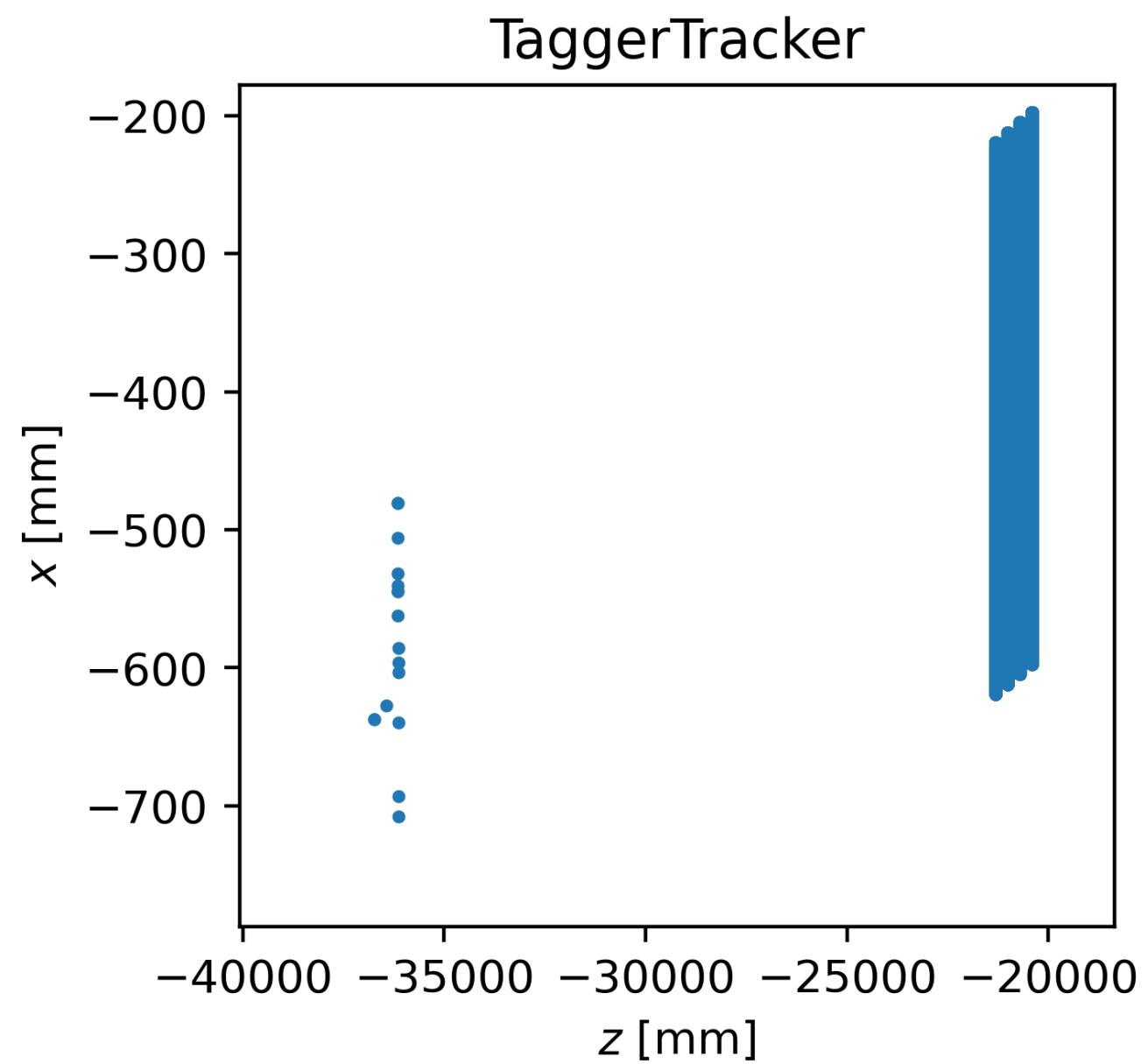
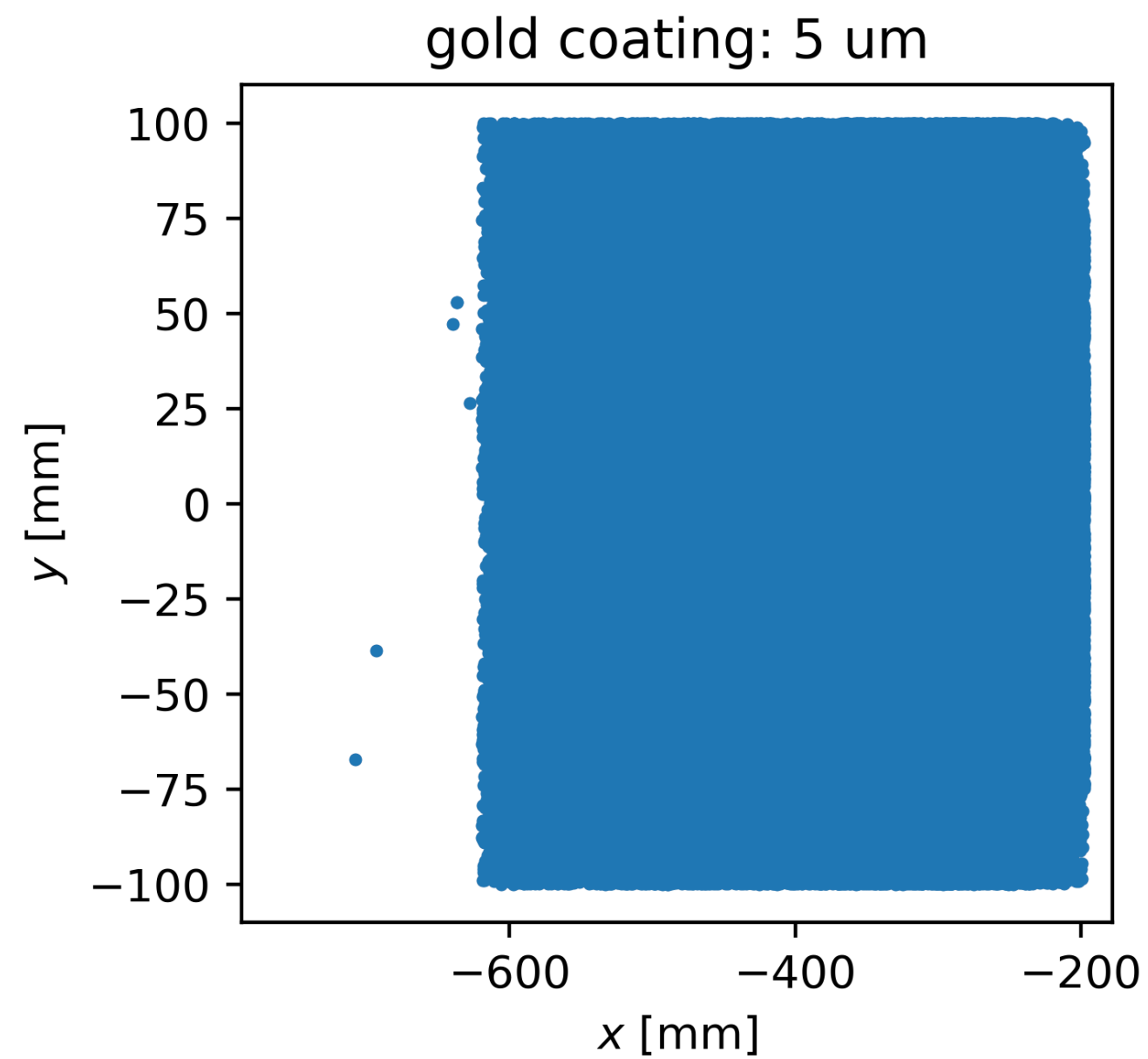
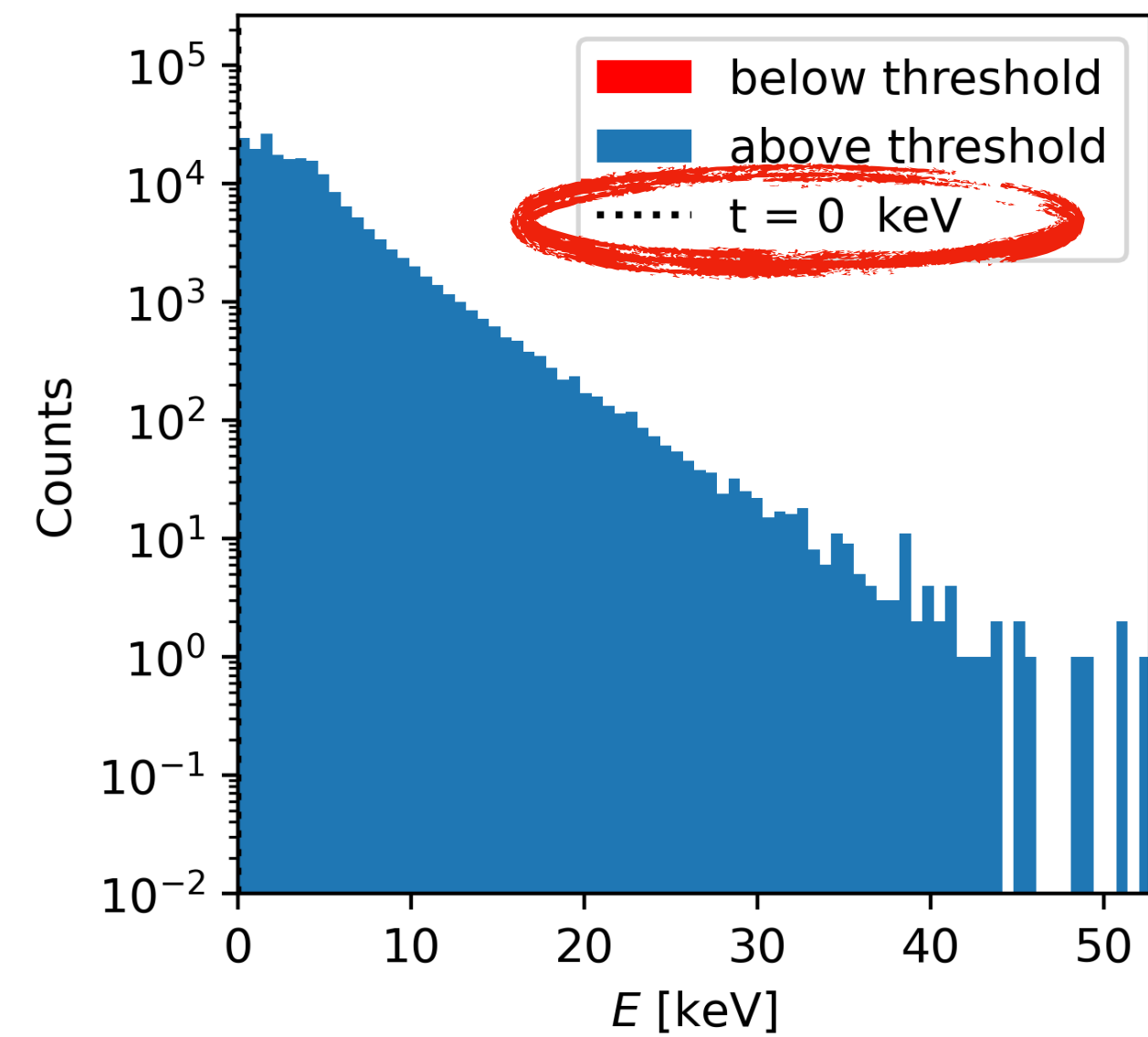
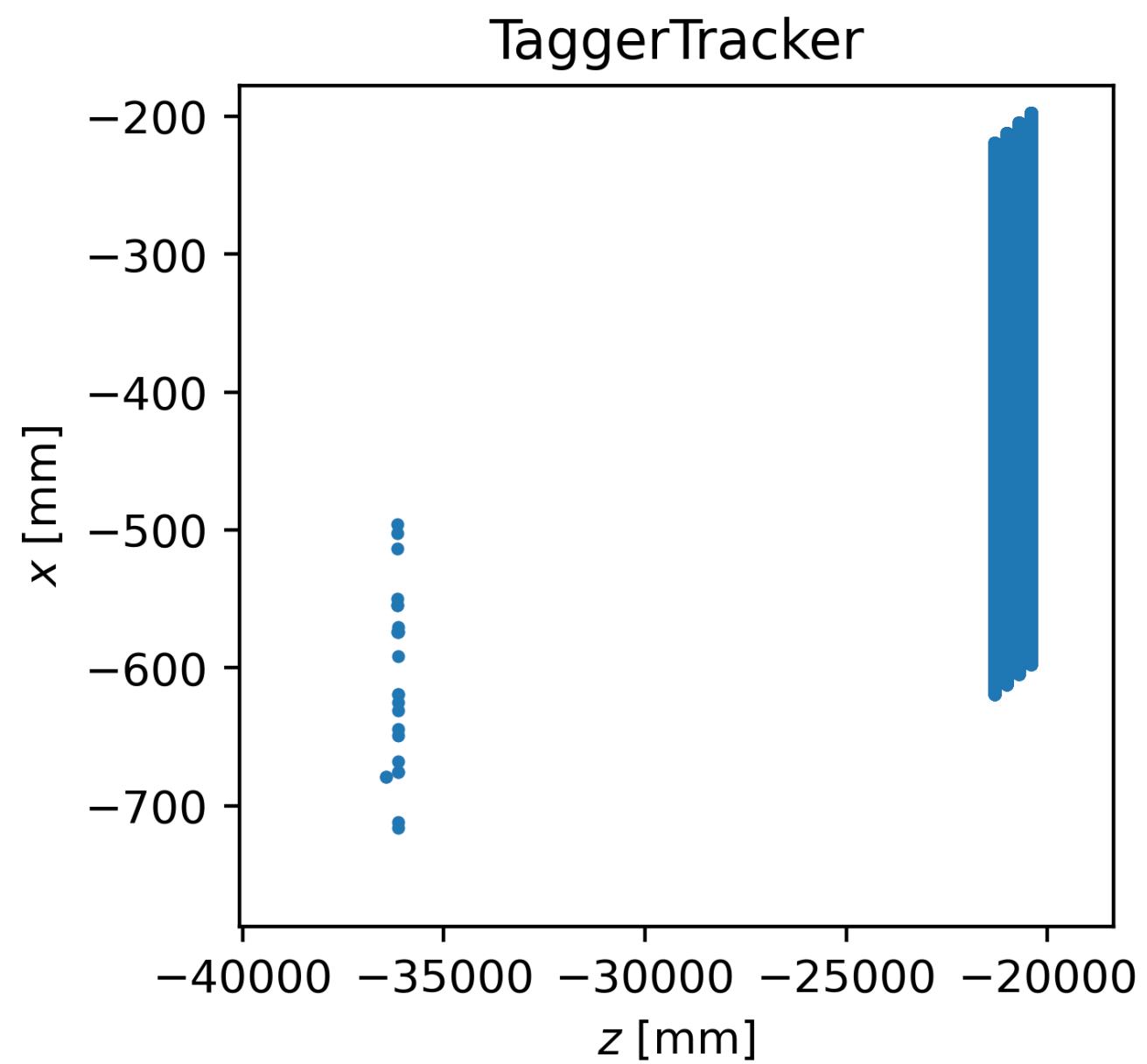
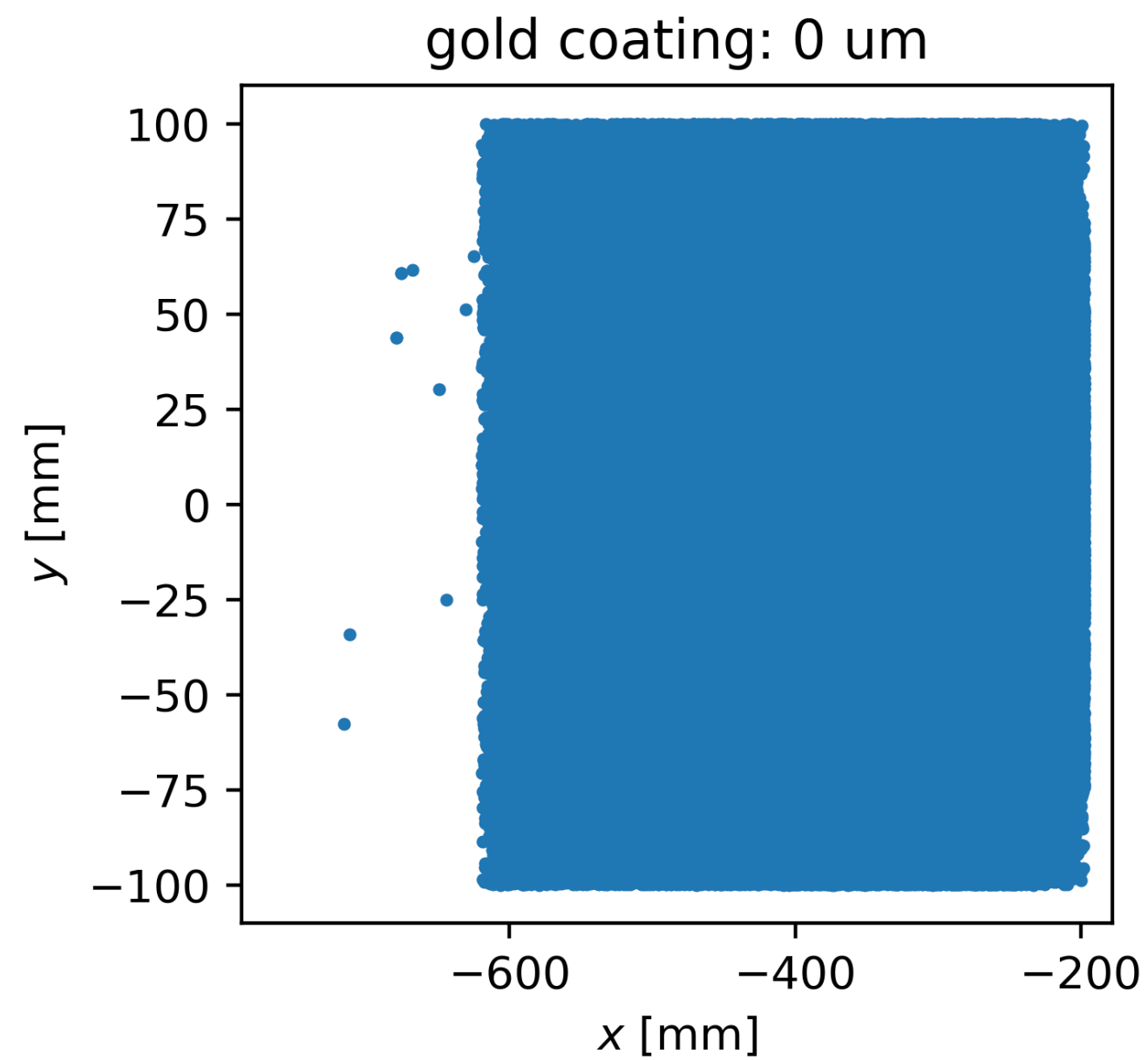


New results including energy thresholds

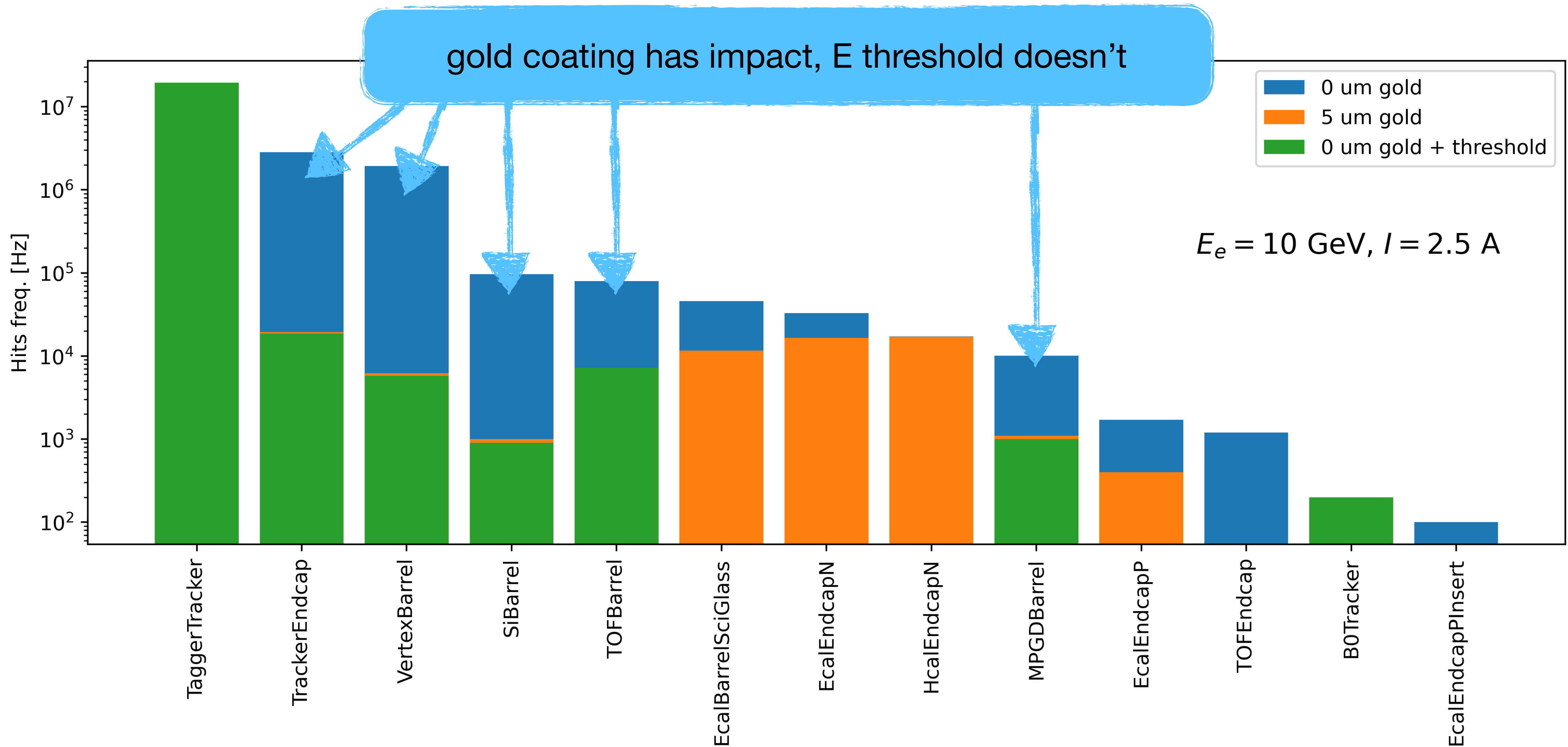


Hits in tagger tracker

Impact of gold coating

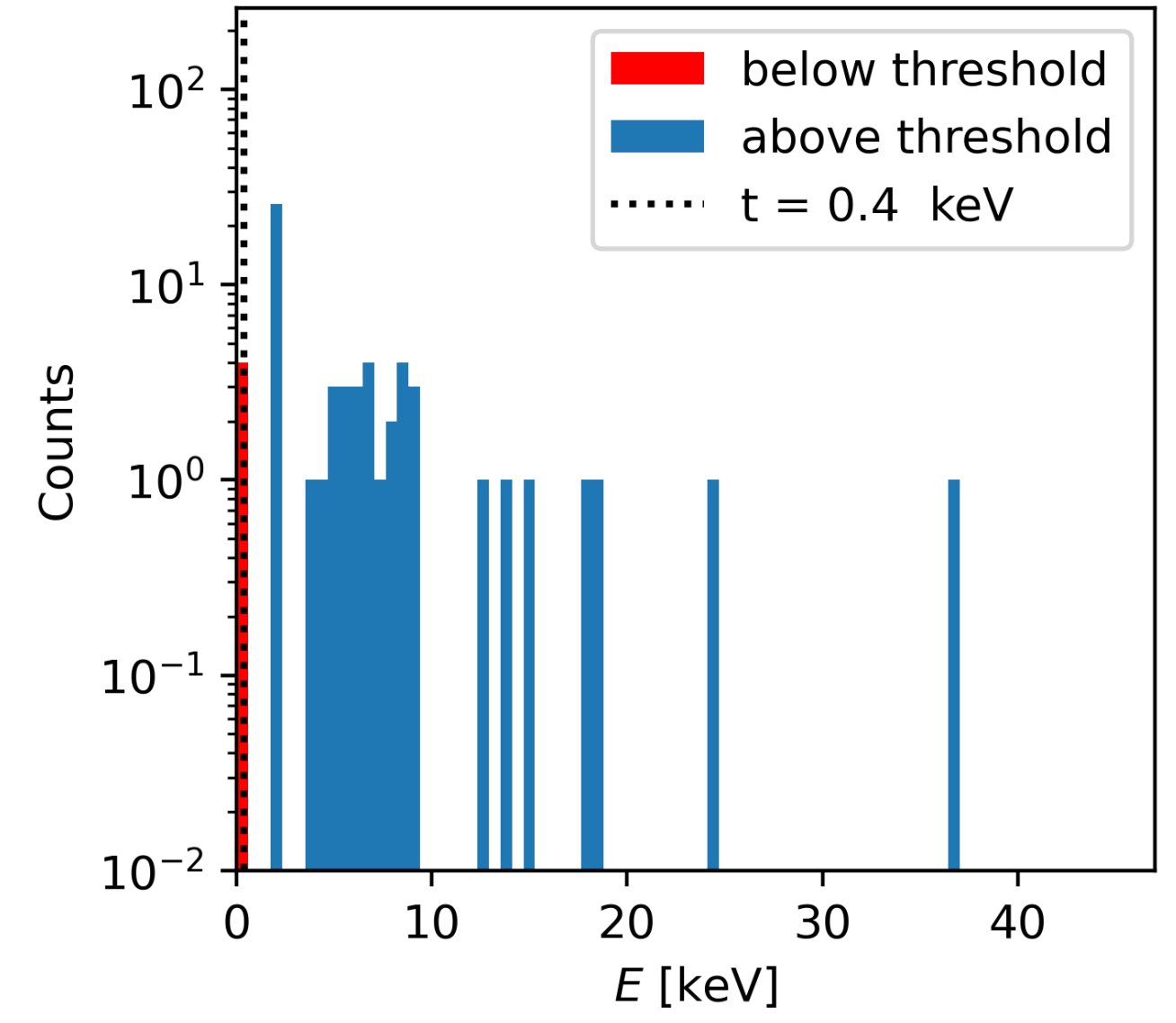
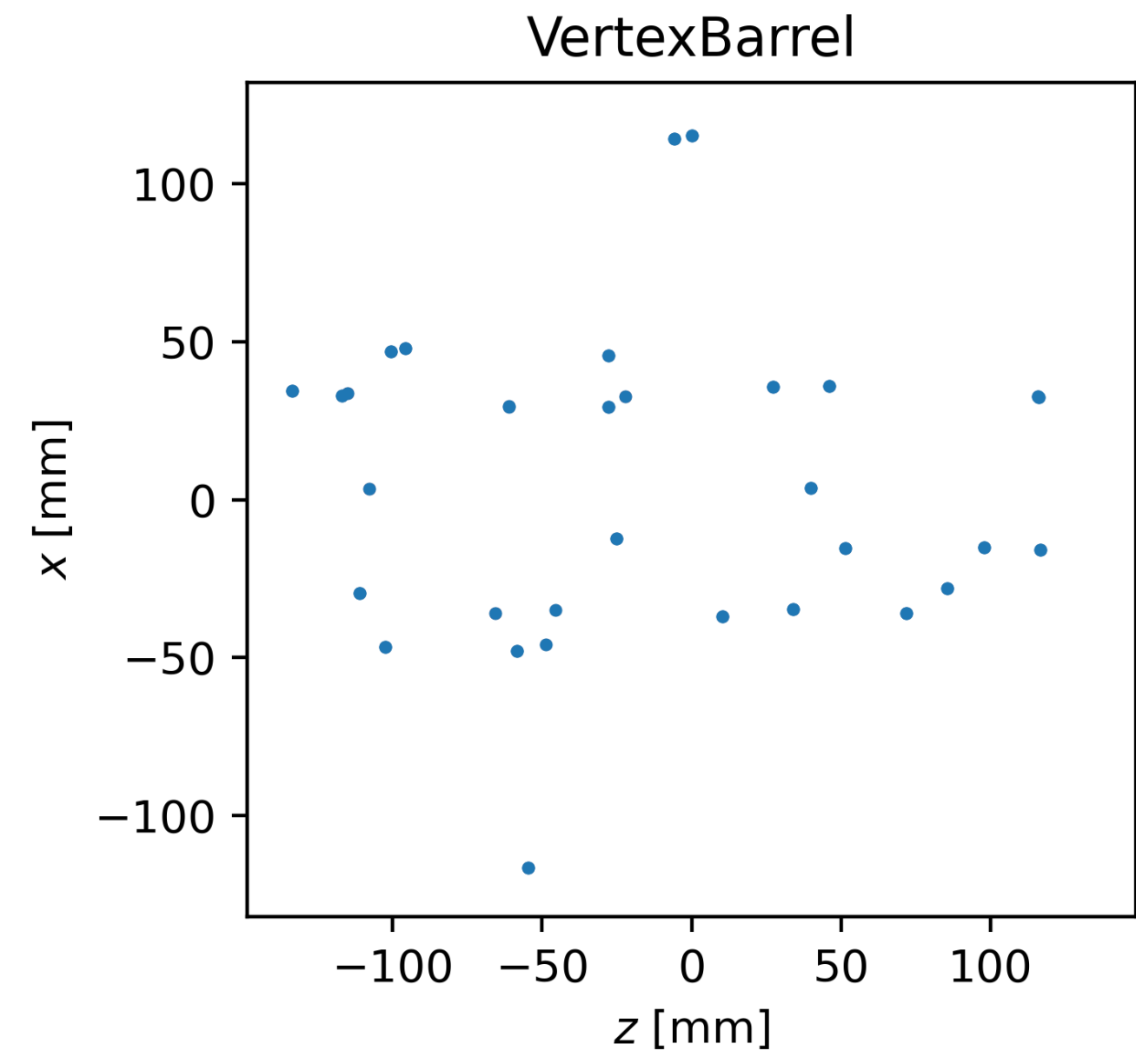
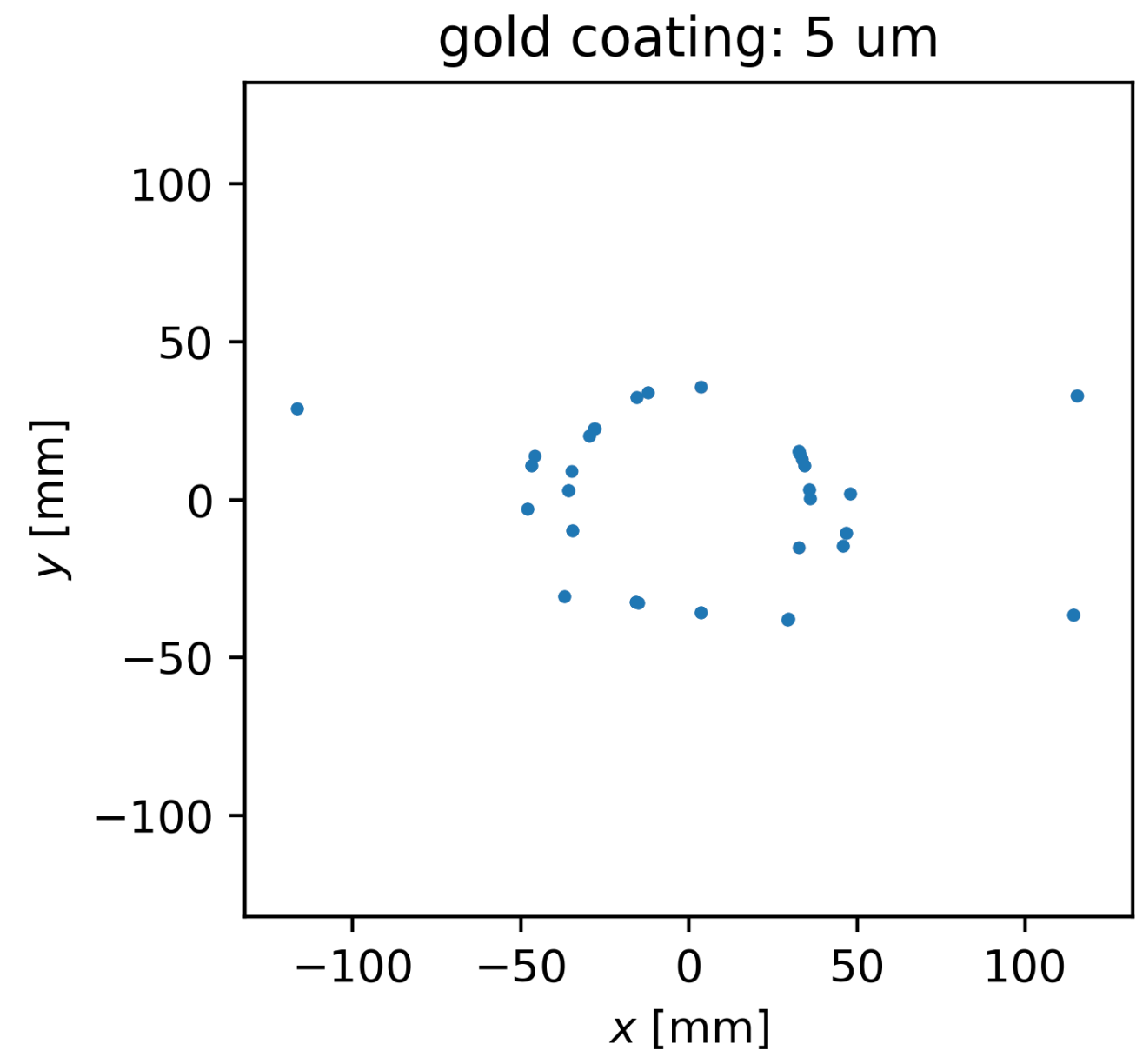
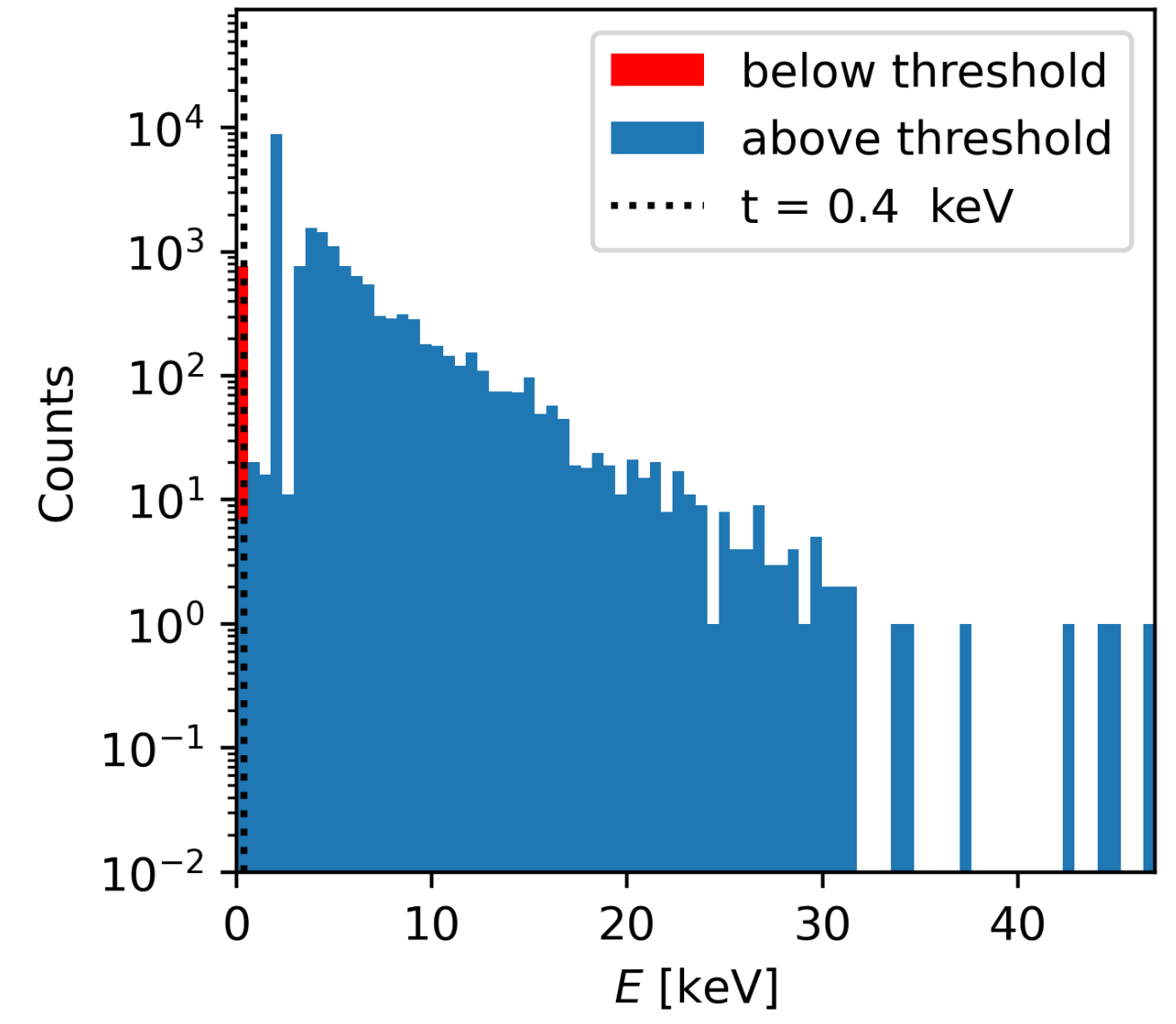
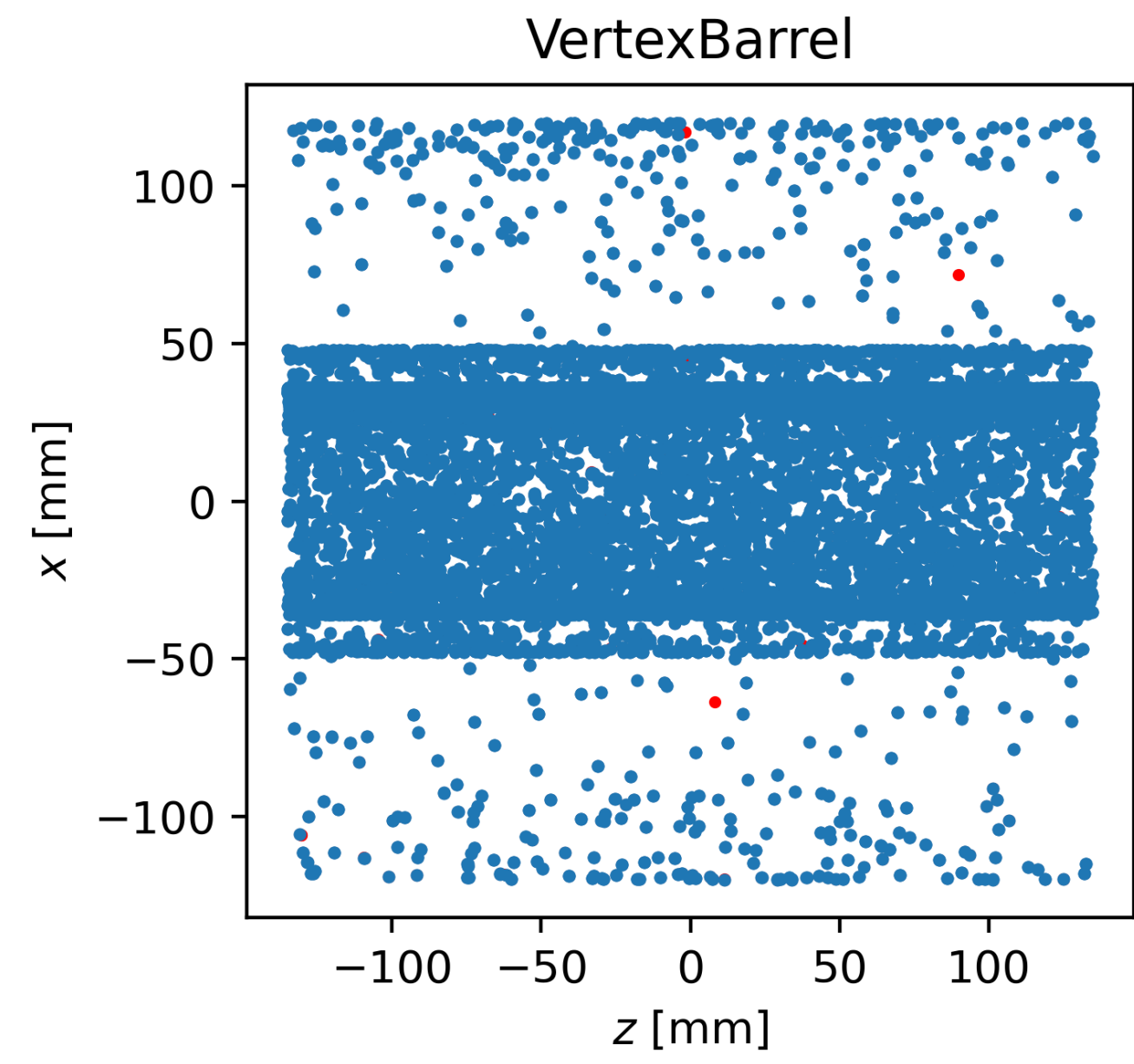
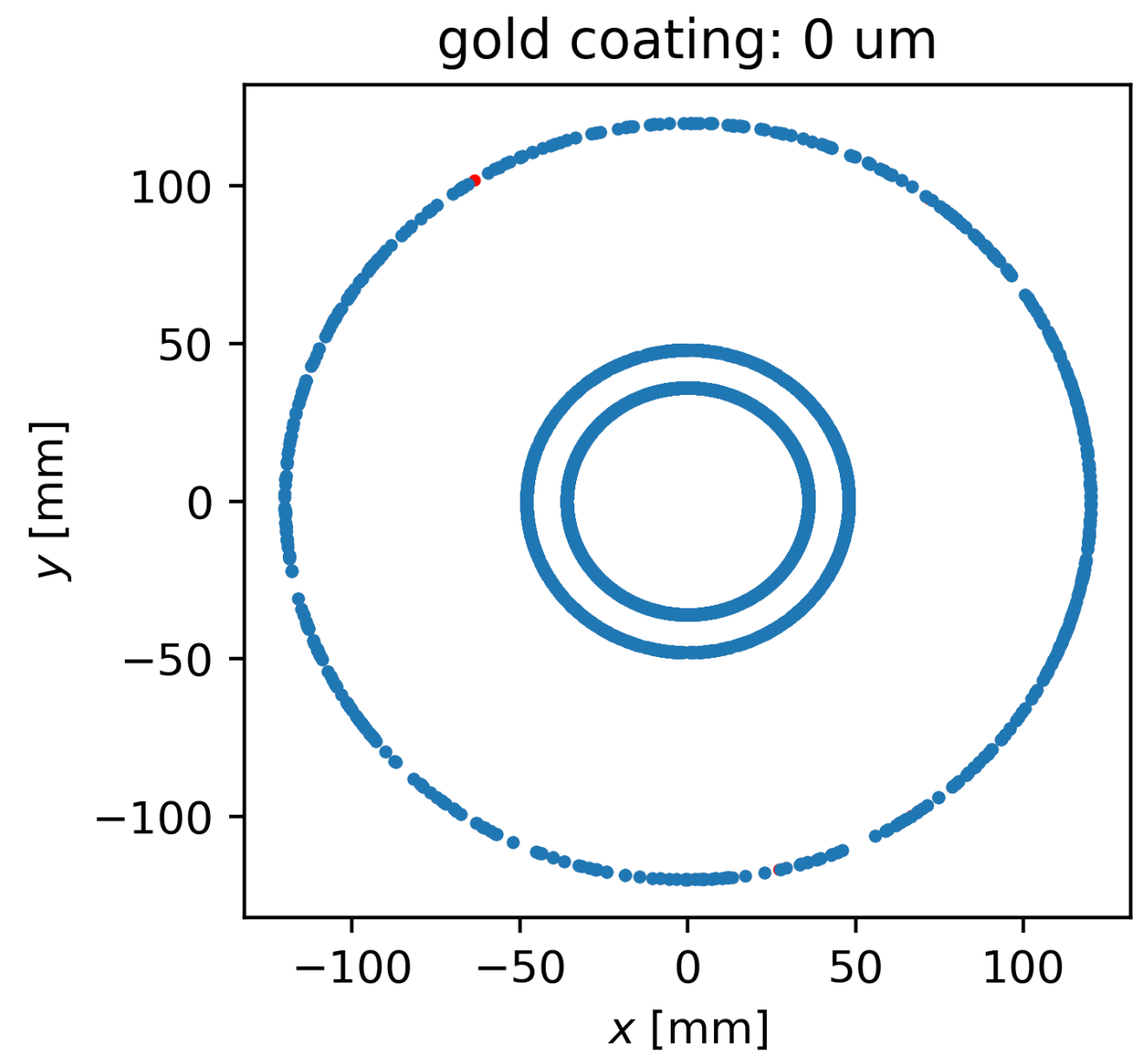


New results including energy thresholds

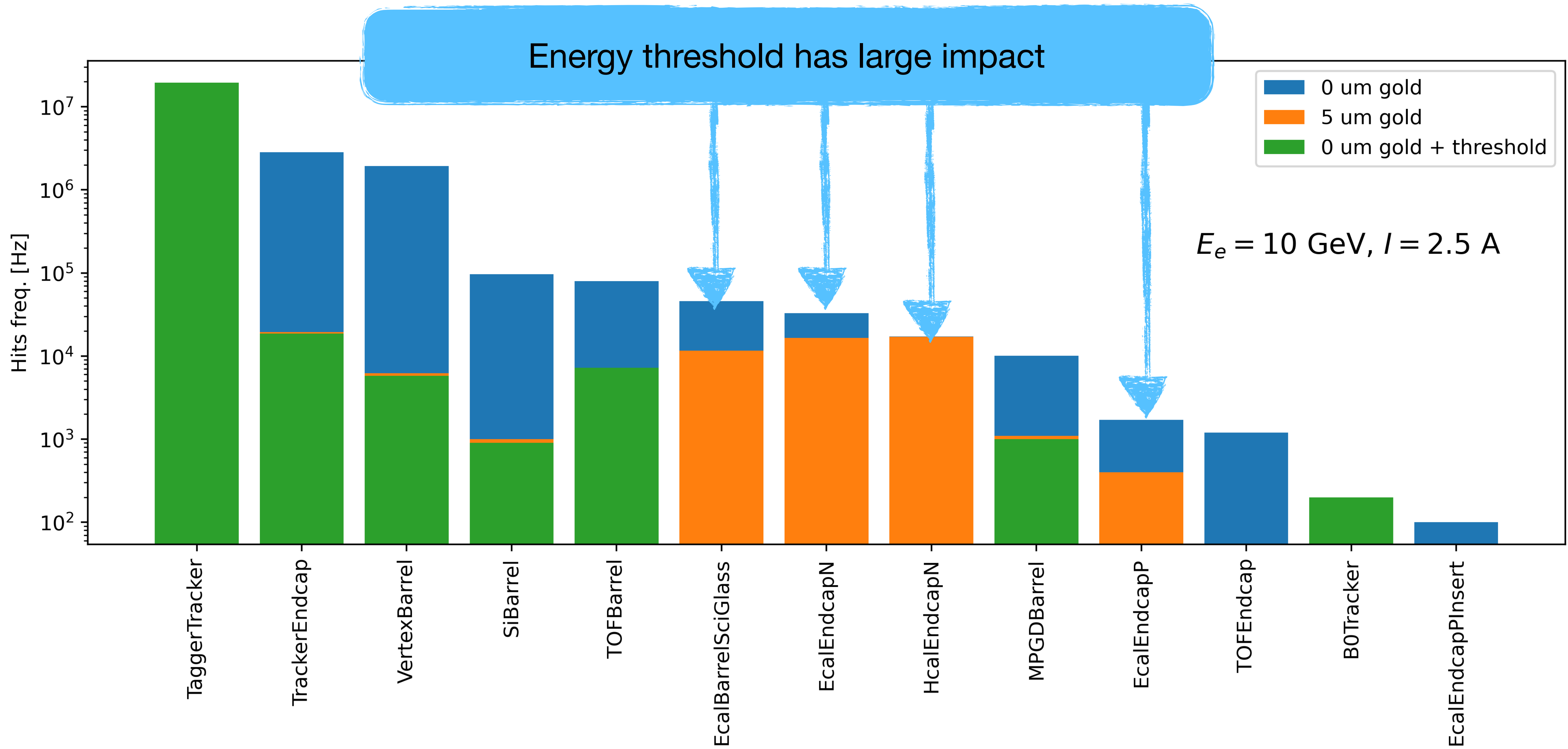


Hits in vertexing layers

Impact of gold coating

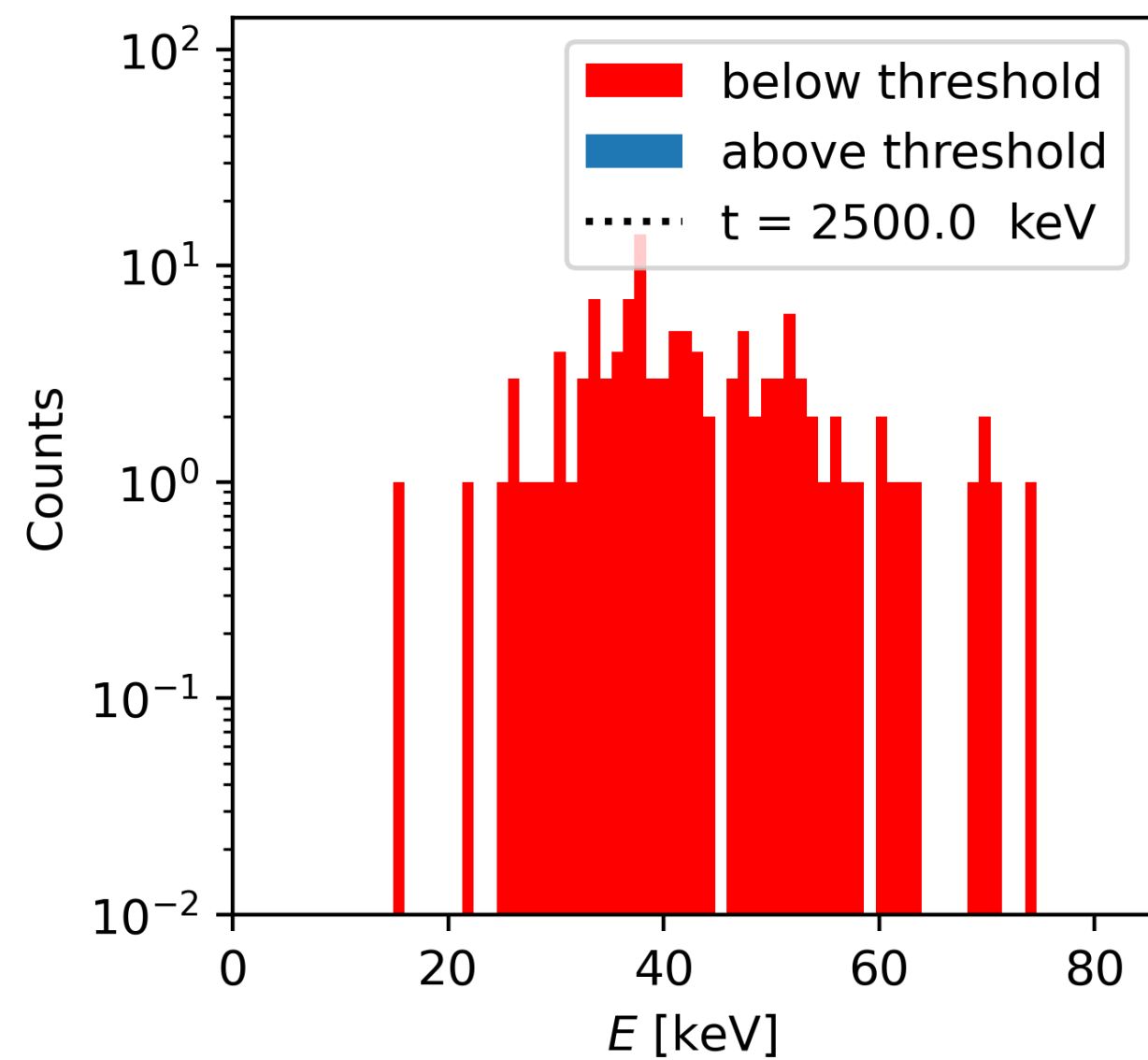
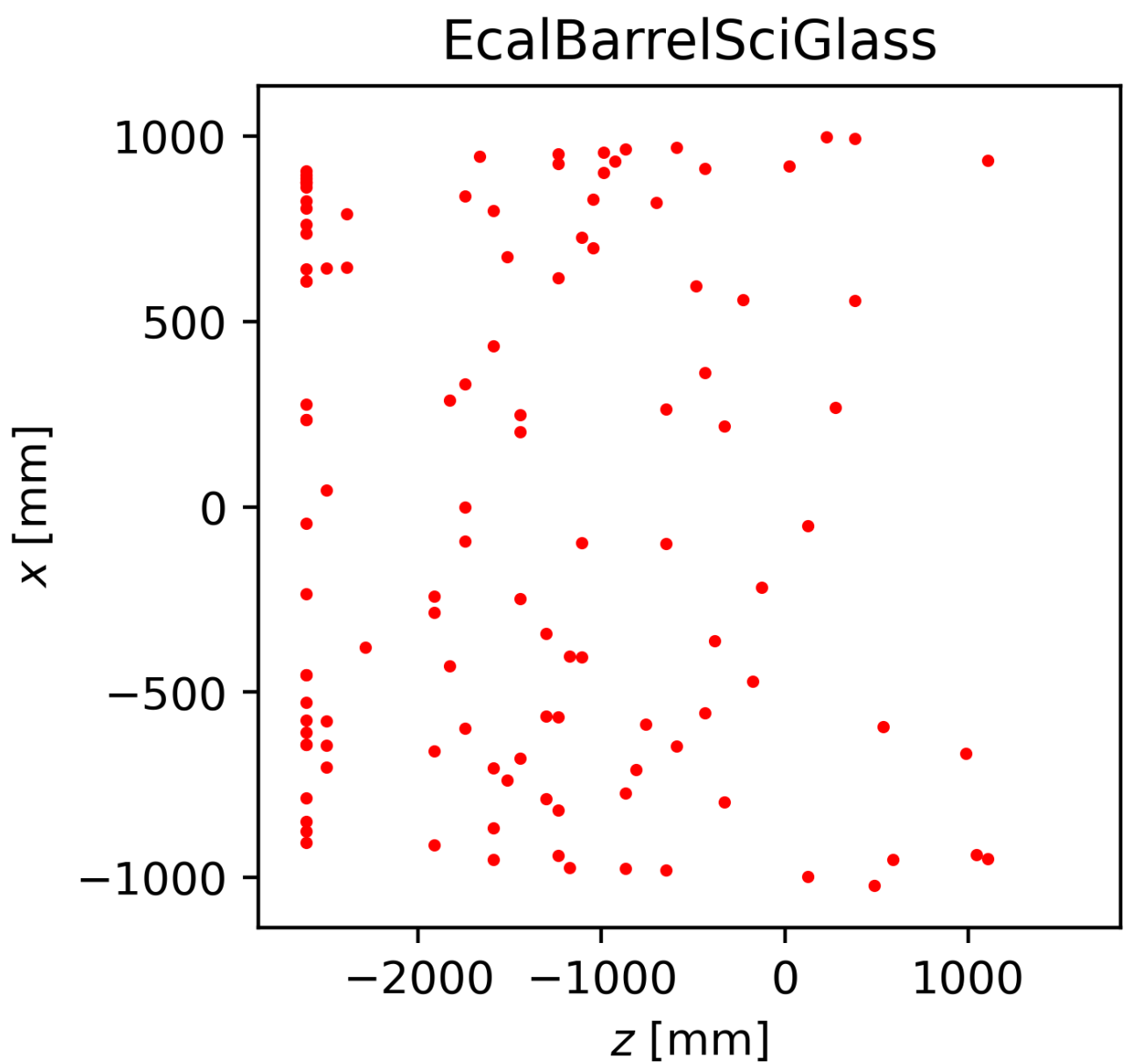
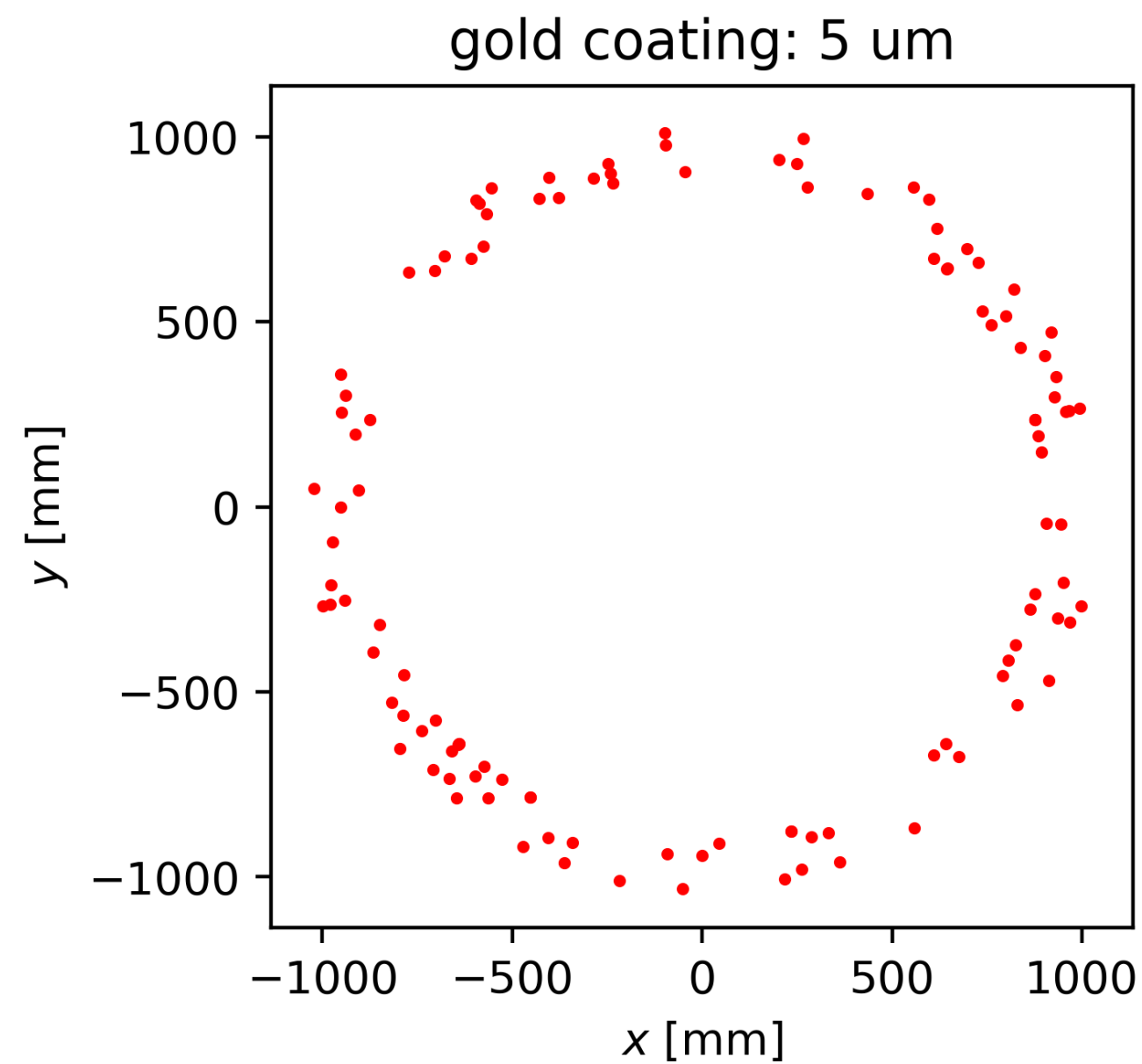
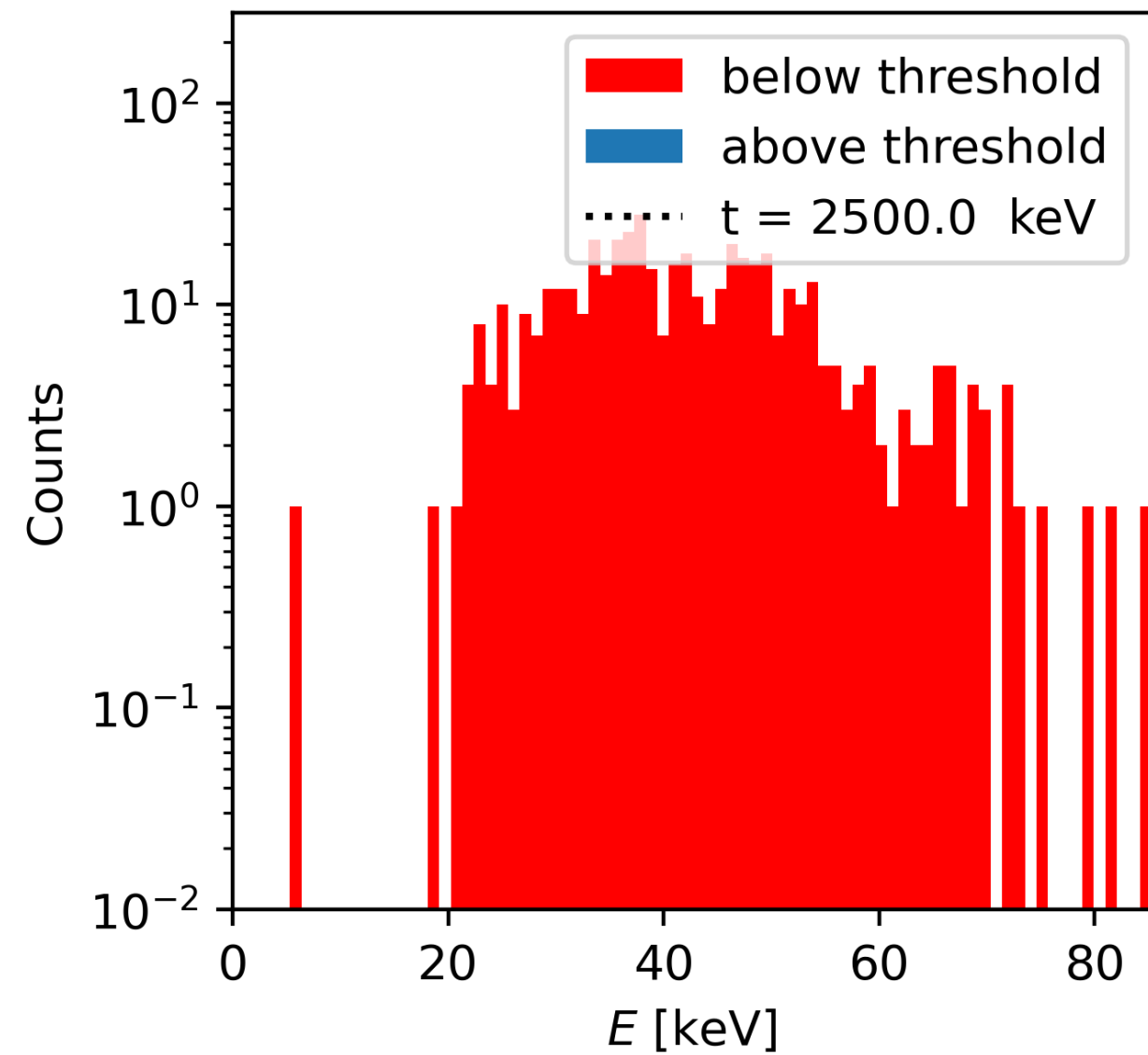
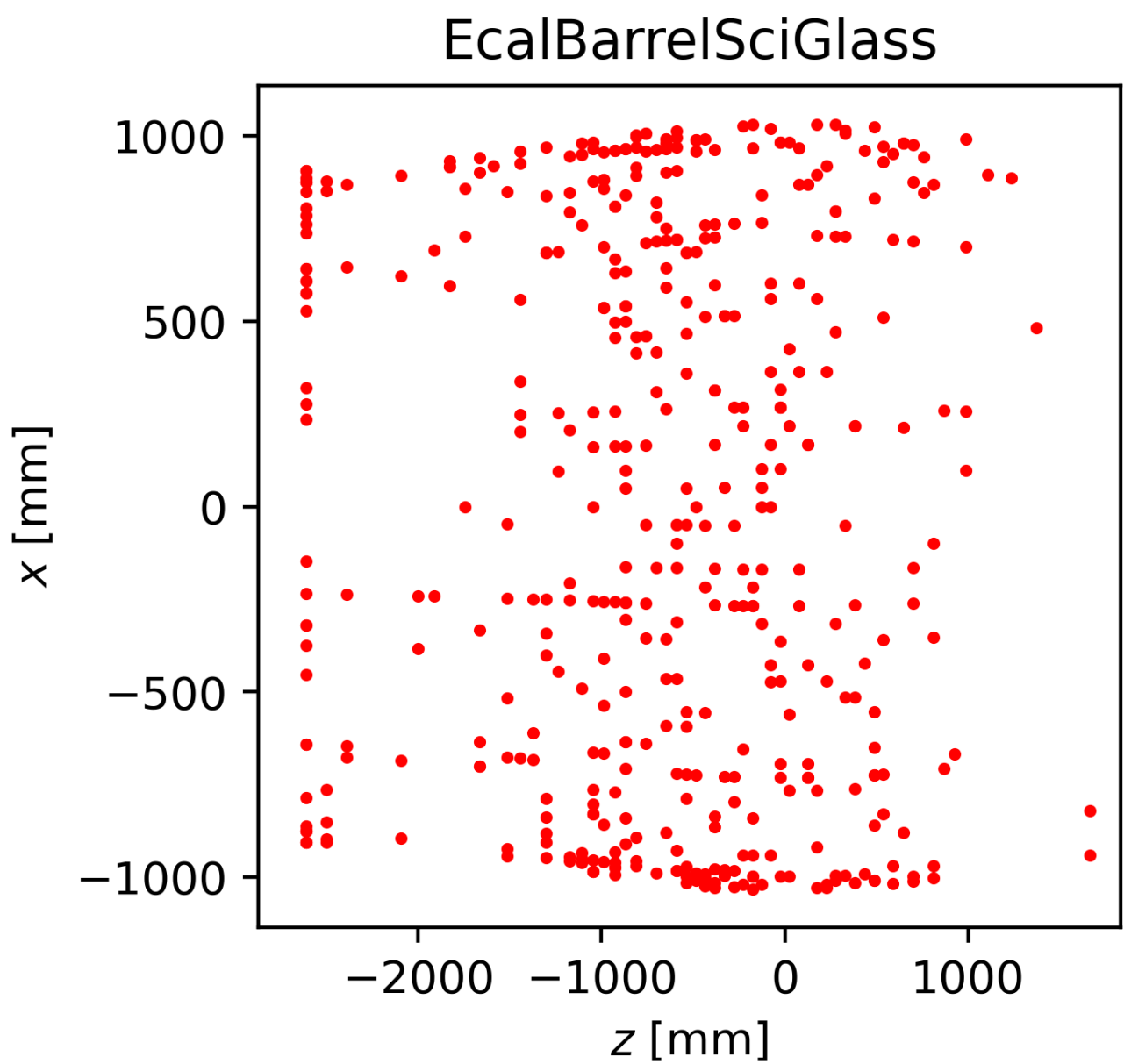
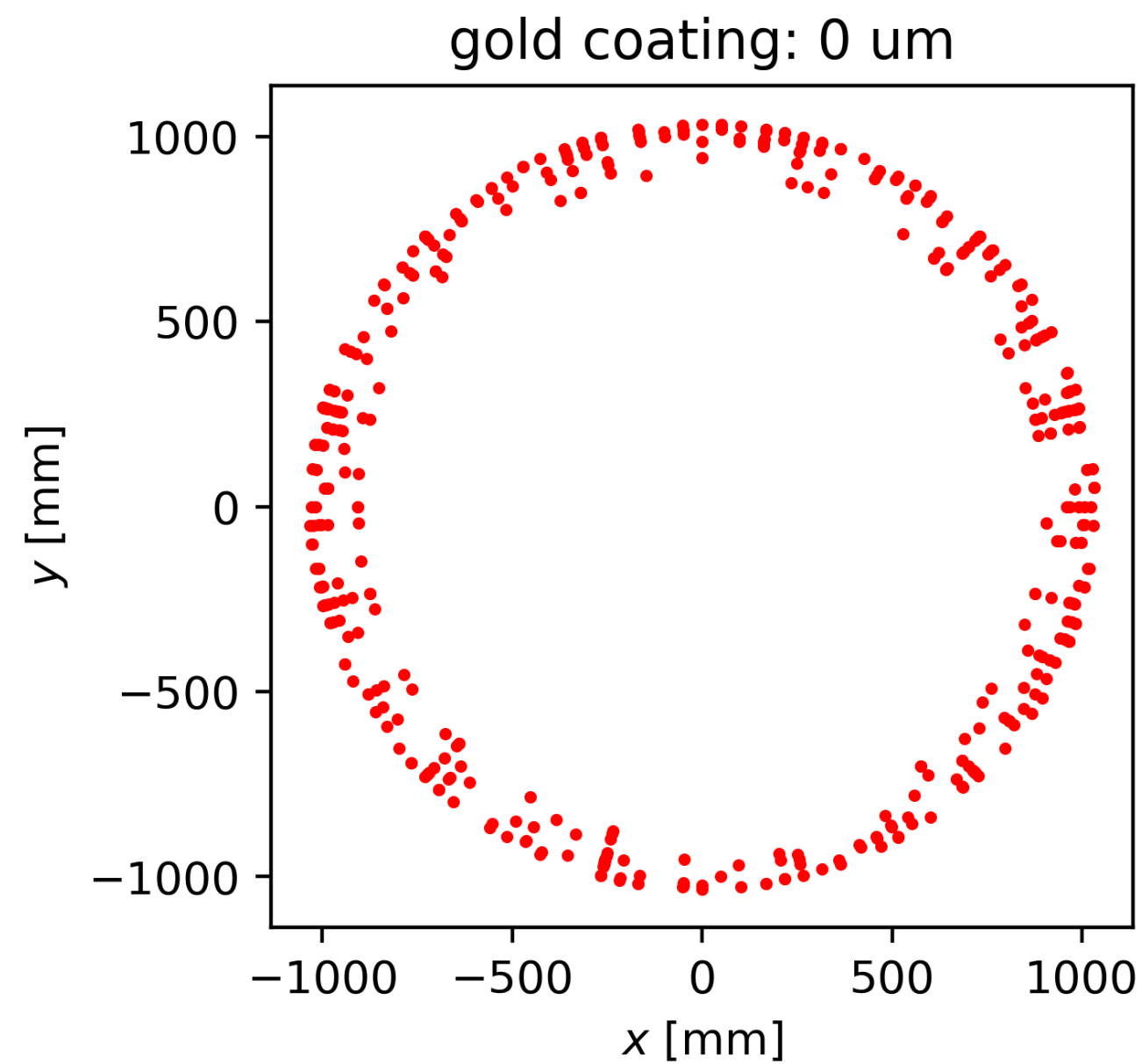


New results including energy thresholds



Hits in Barrel ECal

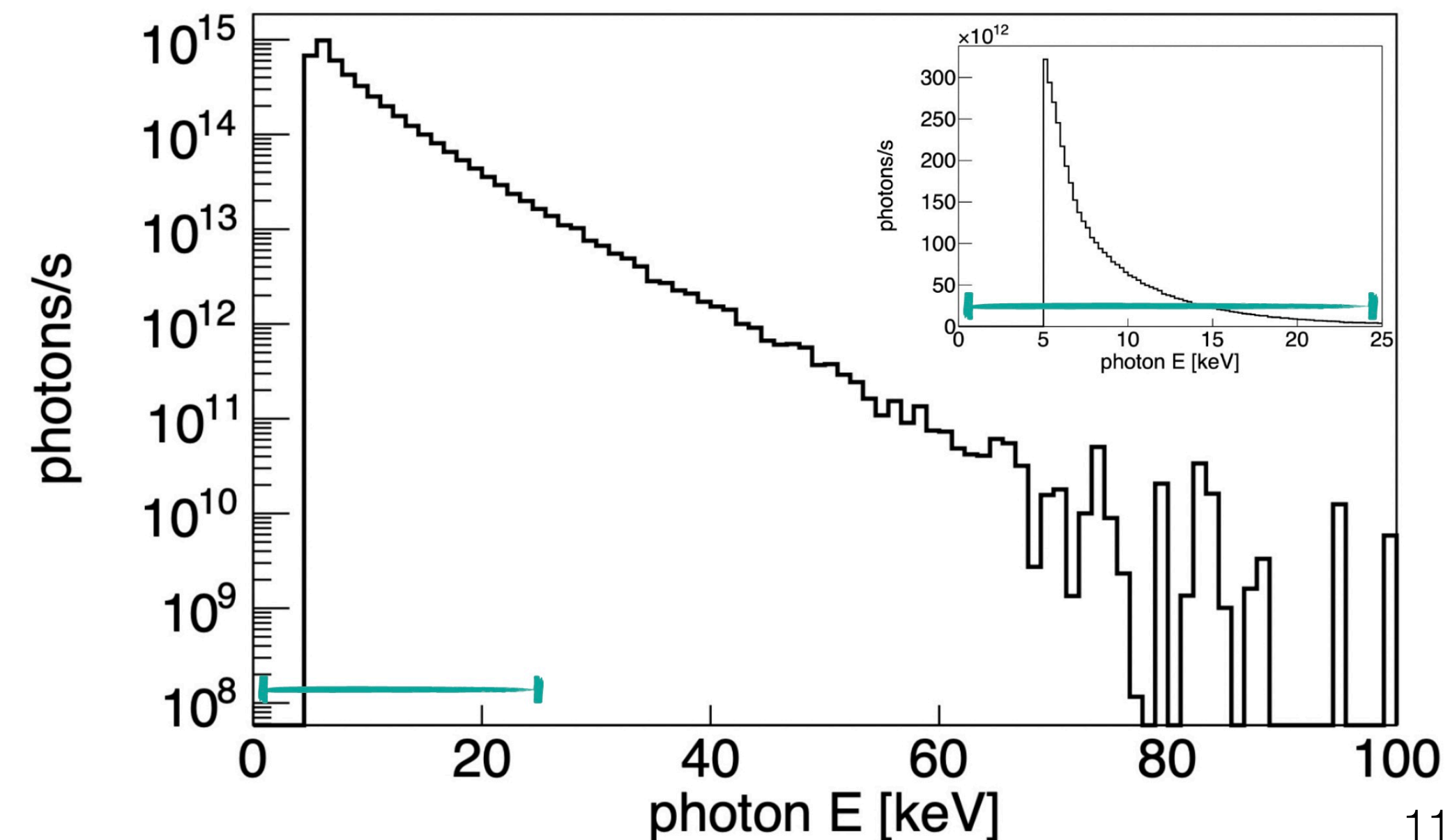
Impact of gold coating



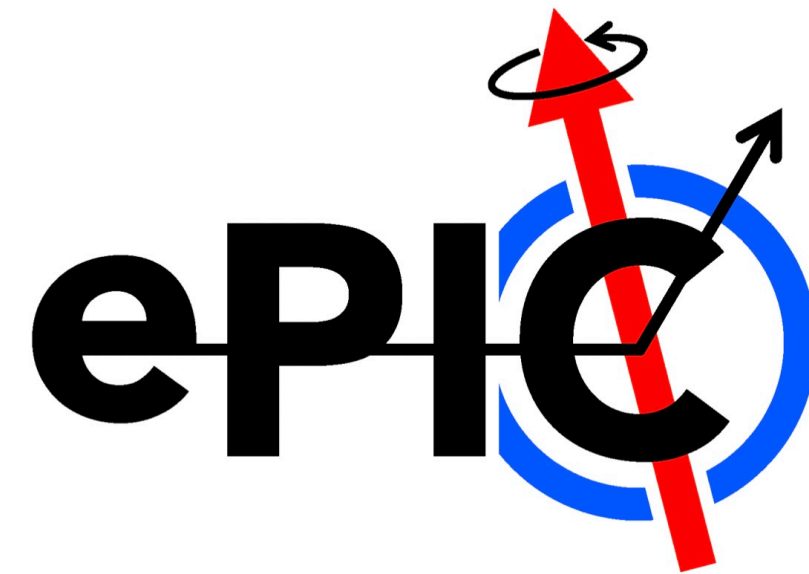
Summary and Conclusions

- Started implementing energy thresholds in SR hit distributions
- Currently using energy thresholds from ATHENA era
 - Several thresholds are missing (default = 0)
 - Are there updated estimates?
- Some thresholds are expected to be lower than current cutoff
 - e.g. MAPS 0.4 keV vs 5 keV input spectrum

Energy spectrum of the input SR photons
(Cutoff at 5 keV)



Thanks for your attention



Backup

Synchrotron event generator code

https://github.com/reynier0611/SR_event_generator

1. Download csv file stored [here](#). You can get this file following one of the two methods below:

```
wget -O combined_data.csv 'https://drive.google.com/uc?export=download&id=1XX78_qeuoMK8xhu0B5QgbU
```

or

```
curl -L 'https://drive.google.com/uc?export=download&id=1XX78_qeuoMK8xhu0B5QgbUy7Lv_xPg&confirm
```

2. Create a yaml configuration file (e.g. `config.yaml`) with the following information:

- `input_single_photons` : path to csv file downloaded in step 1.
- `n_events` : number of events to be generated.
- `integration_window` : time window that will define one event.
- `seed` : random seed for reproducibility. Set to 0 to leave the seed unconstrained.

3. Run the generator as:

```
python3 sr_generator.py --configFile config.yaml
```

Links to previous studies

[Jin Huang - Beam gas, neutron flux, radiation does at EIC](#)

[Elke Aschenauer - EIC Physics and Detector](#)

[Wiki - ePIC Background](#)

[Wiki - ATHENA Background](#)

[Wiki - beam backgrounds](#)