

Positron 4GeV Validation

Dark SHINE Simulation and Analysis Meeting

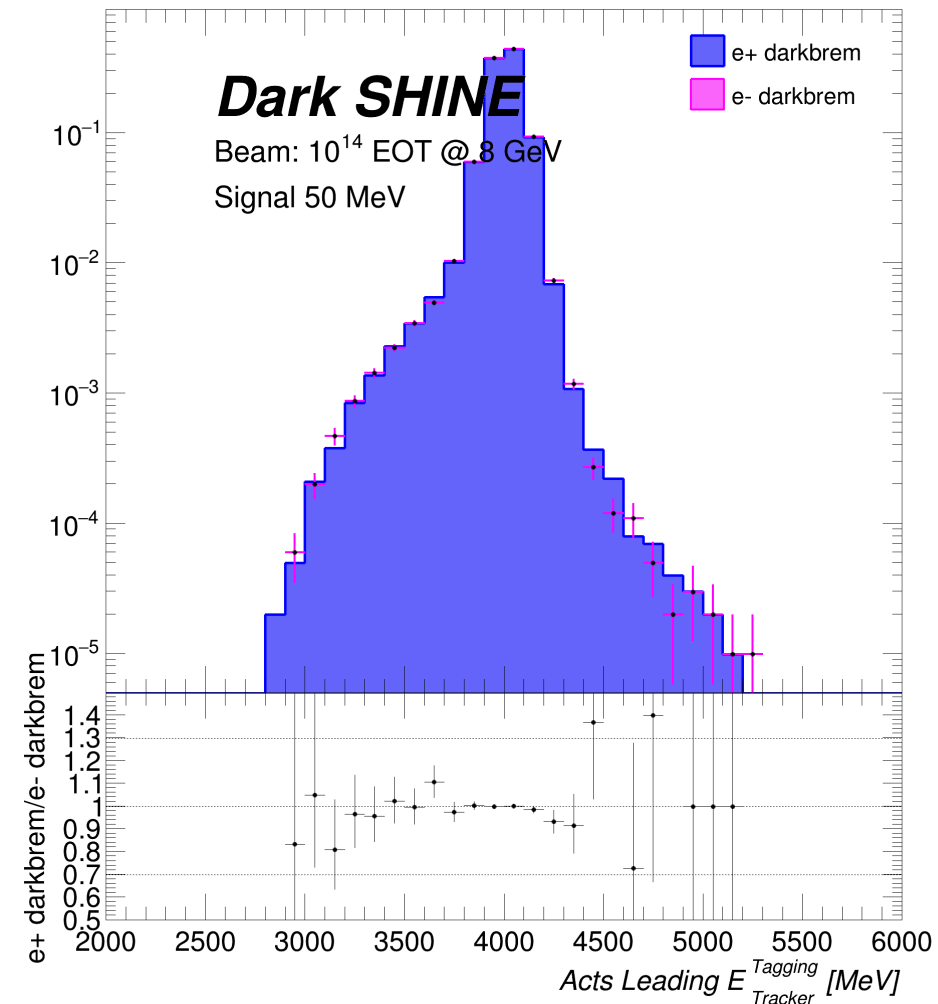
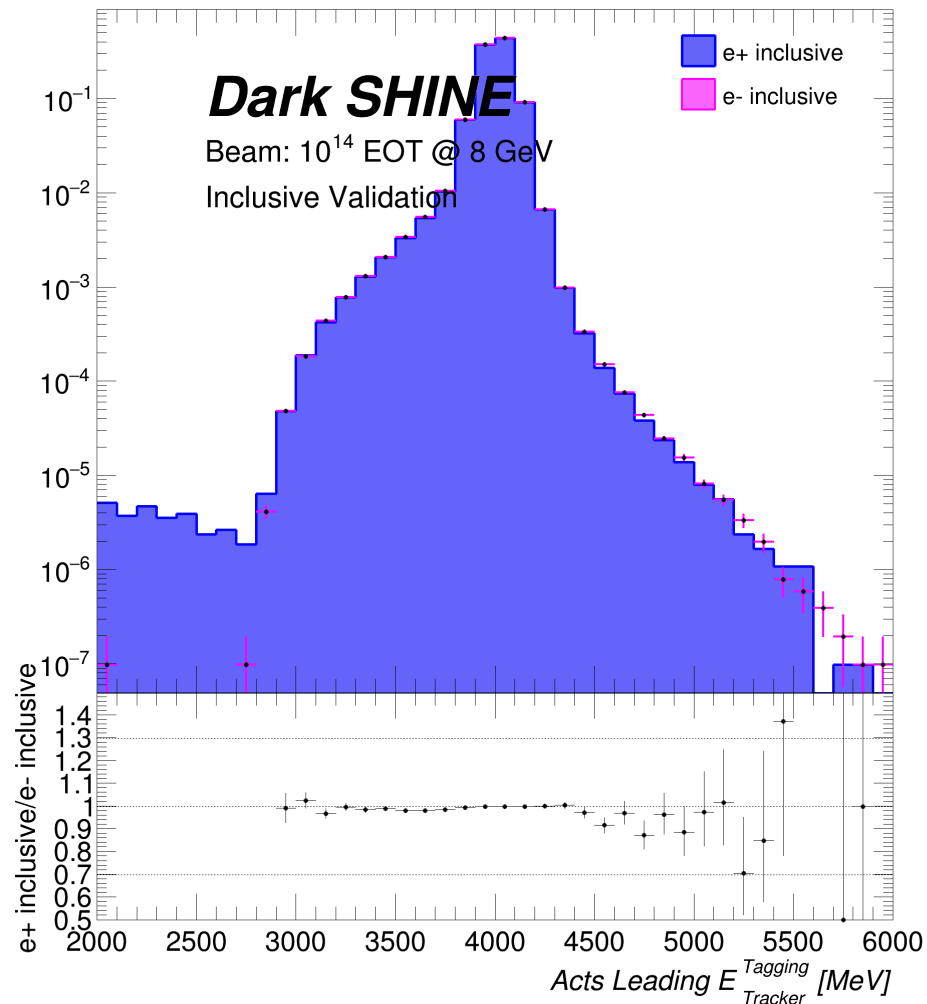
Xuliang Zhu¹ and Tong Sun¹

6/4/2024



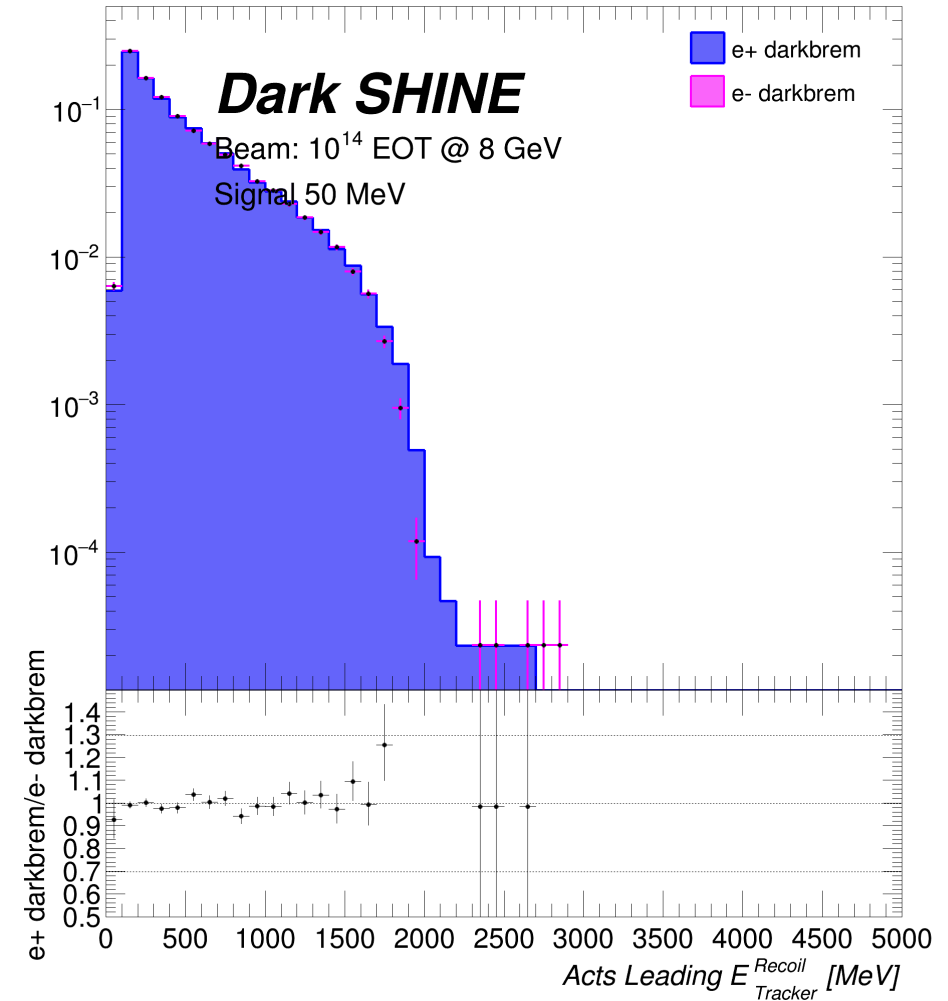
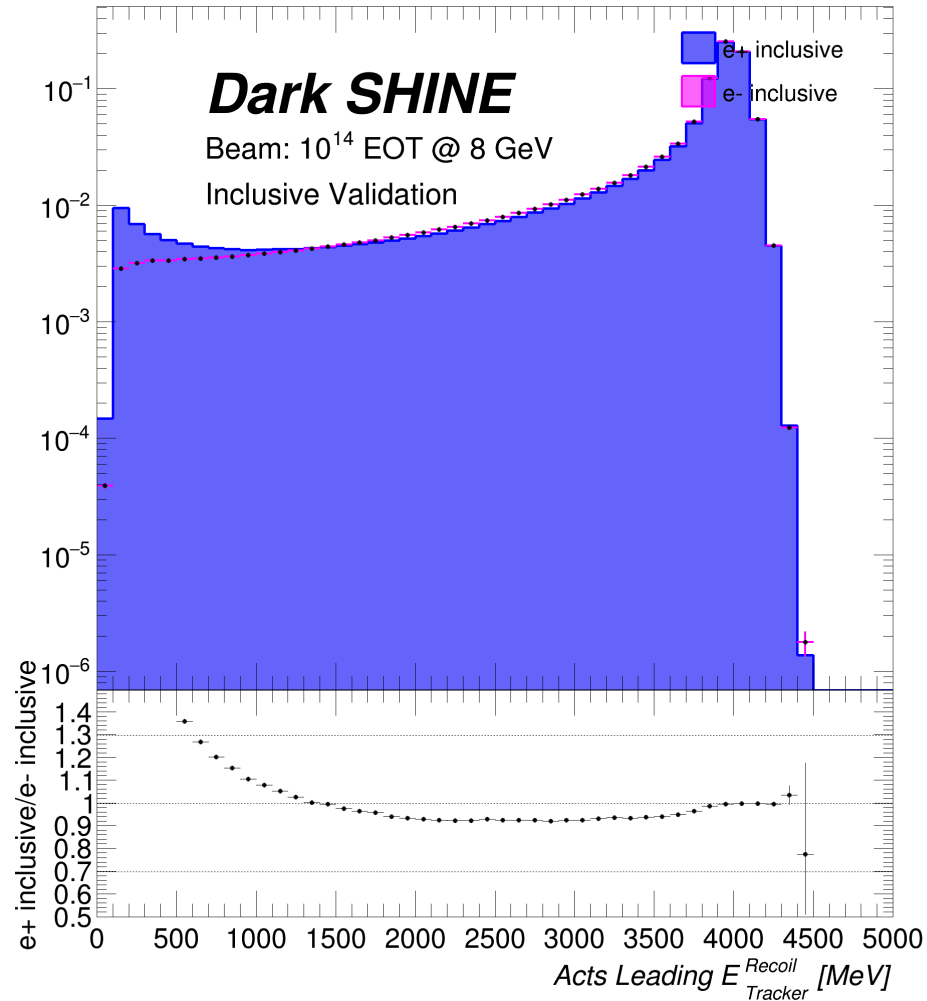
Validation: e^+ / e^-

Tagging Tracker Reconstruction

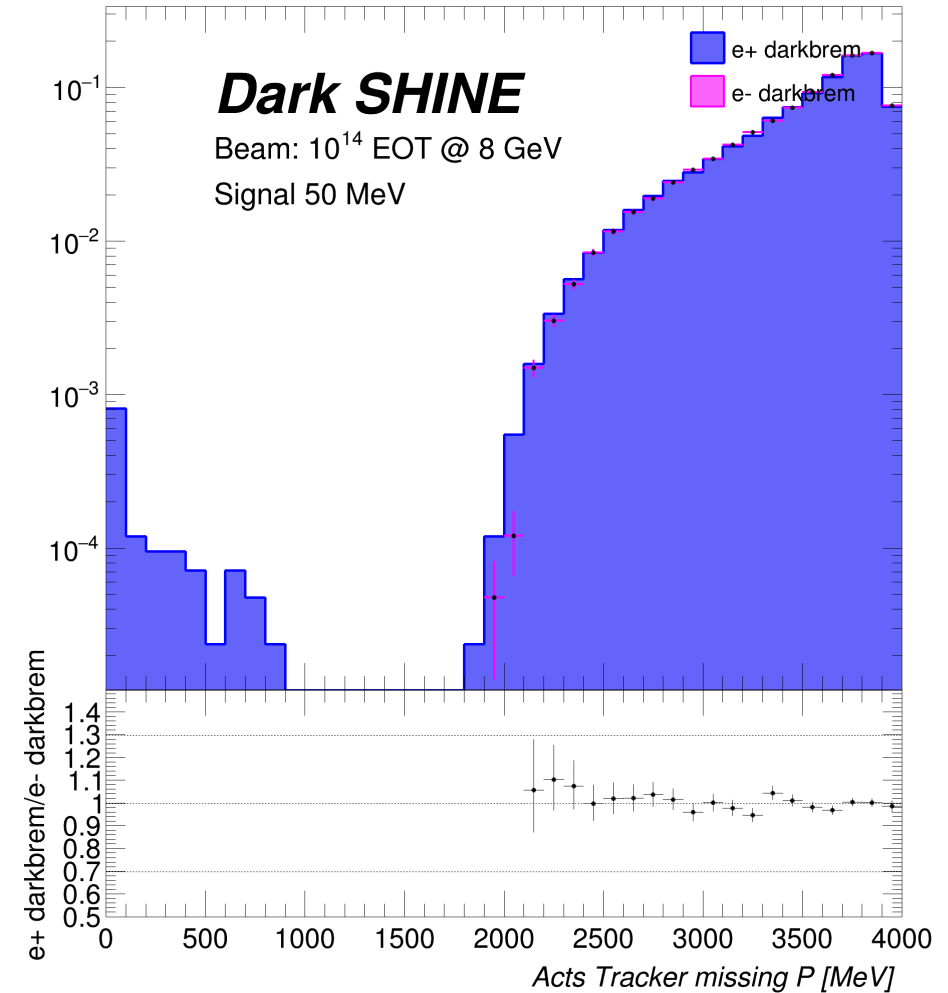
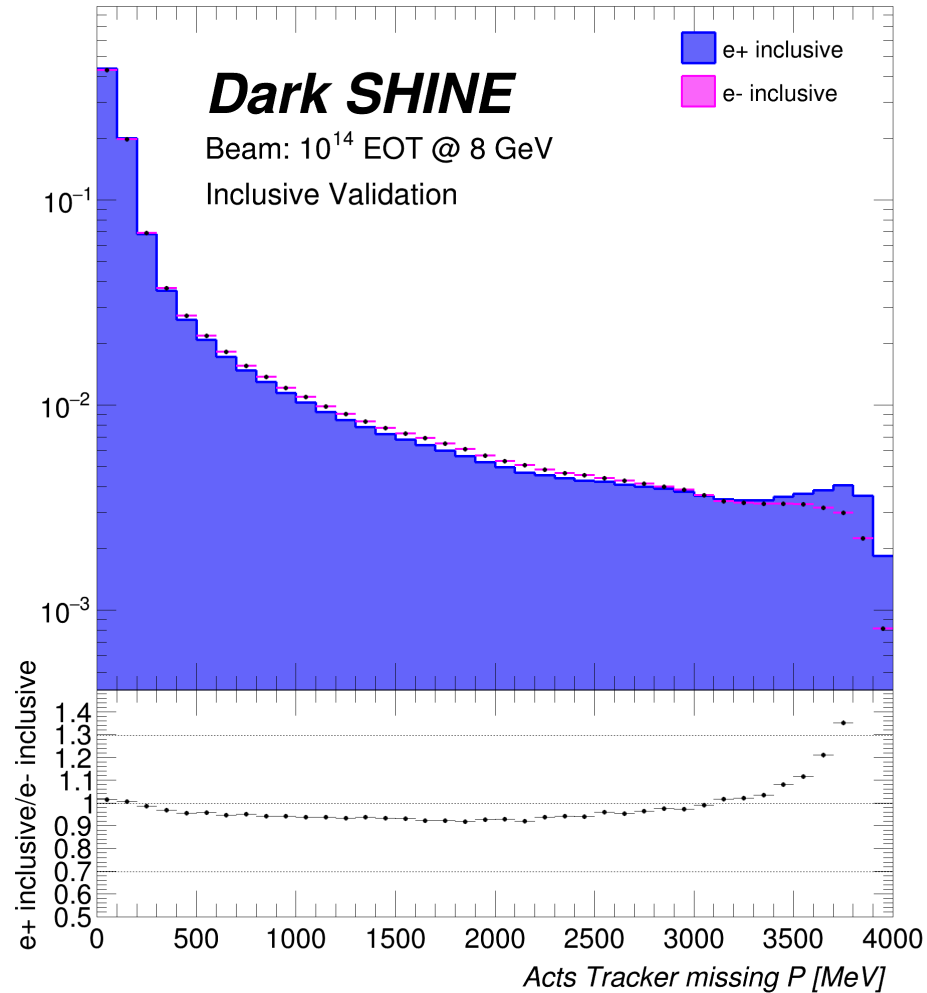


Validation: e^+ / e^-

Recoil Tracker Reconstruction

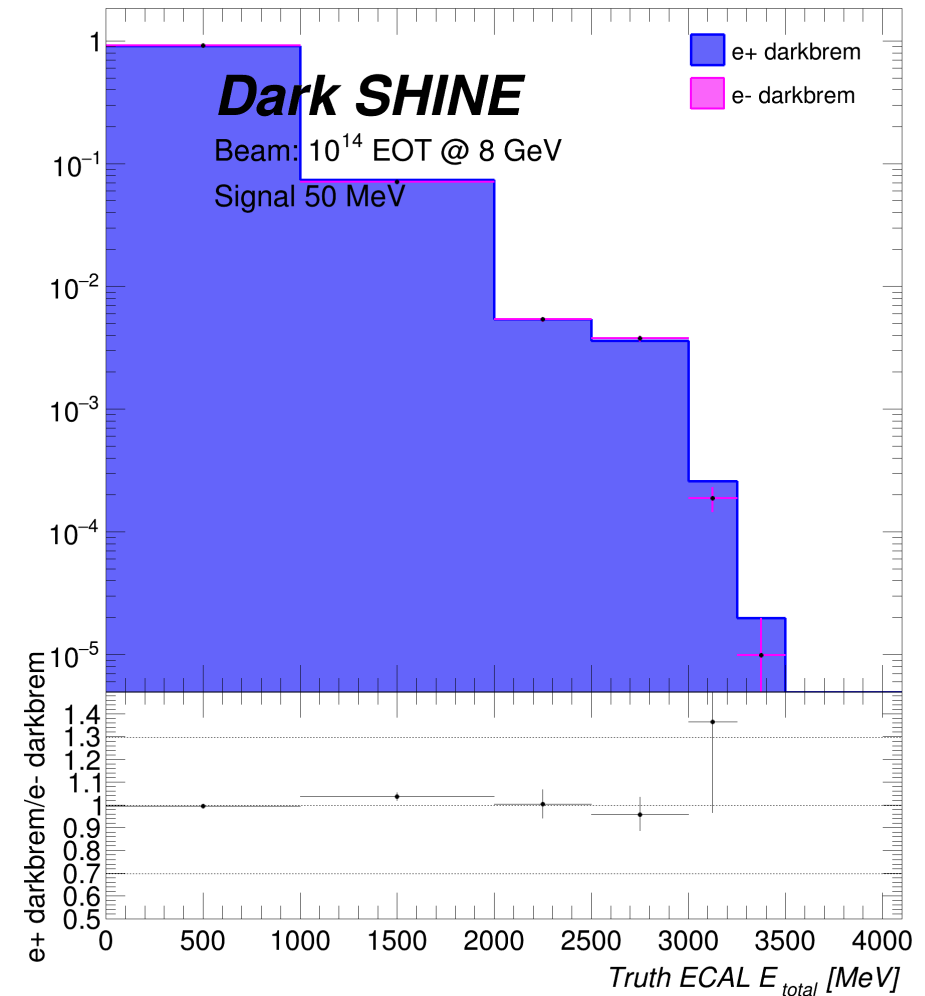
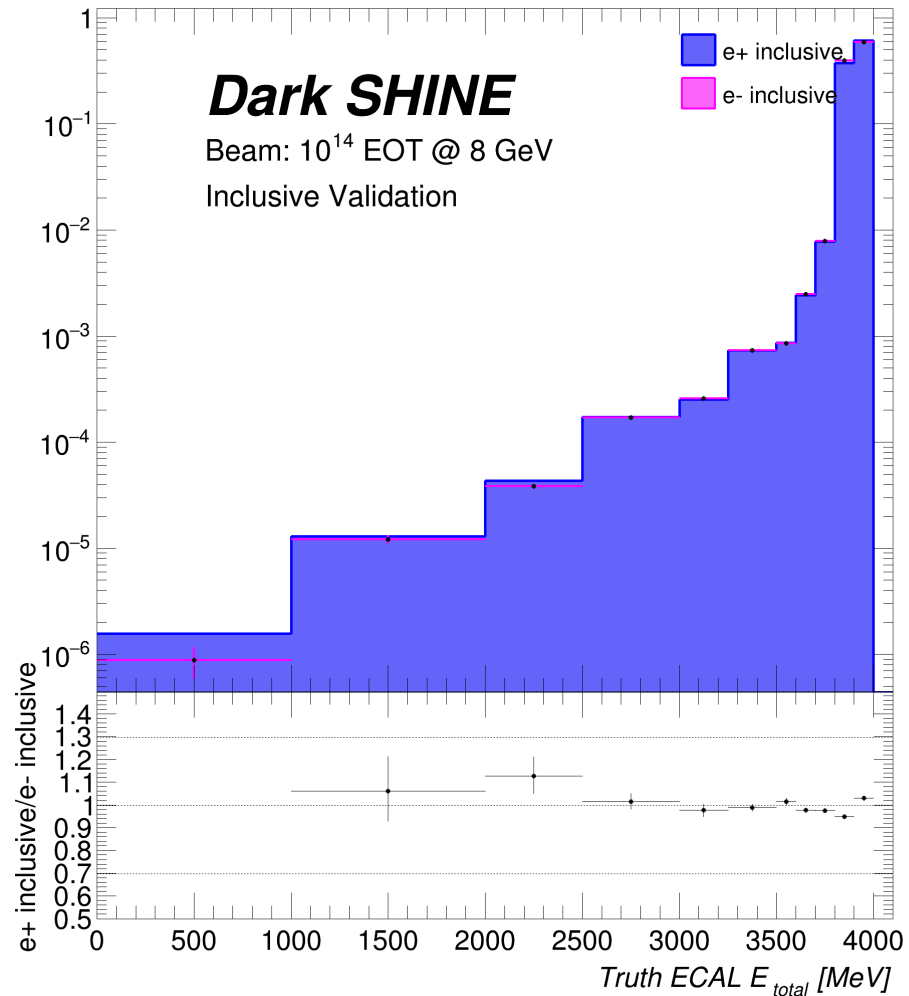


Validation: e^+ / e^- missing P



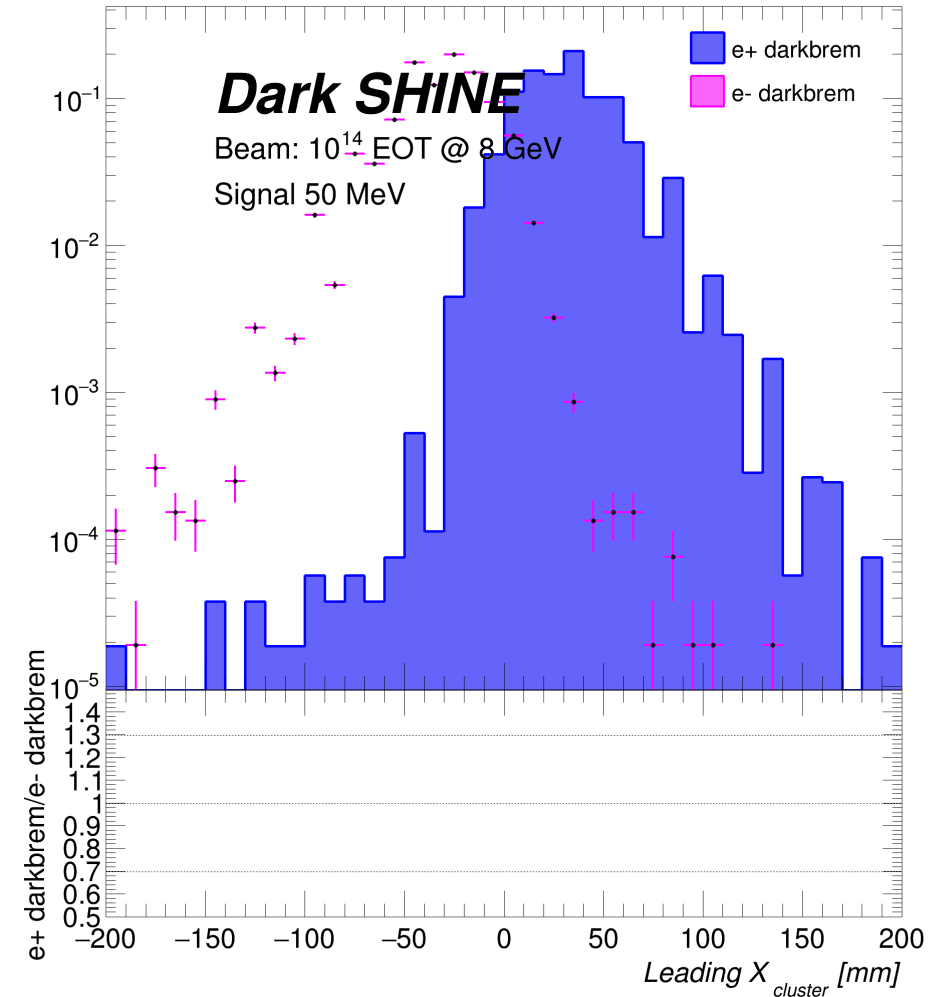
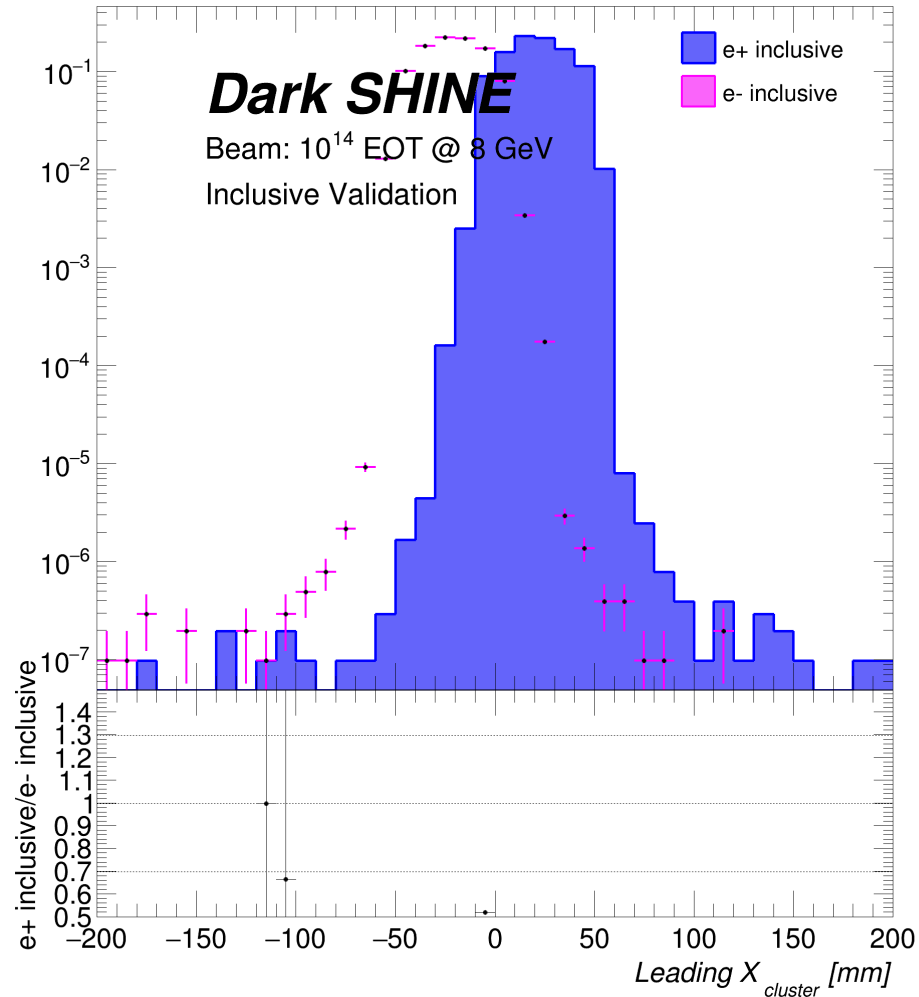
Validation: e^+ vs e^-

ECAL truth



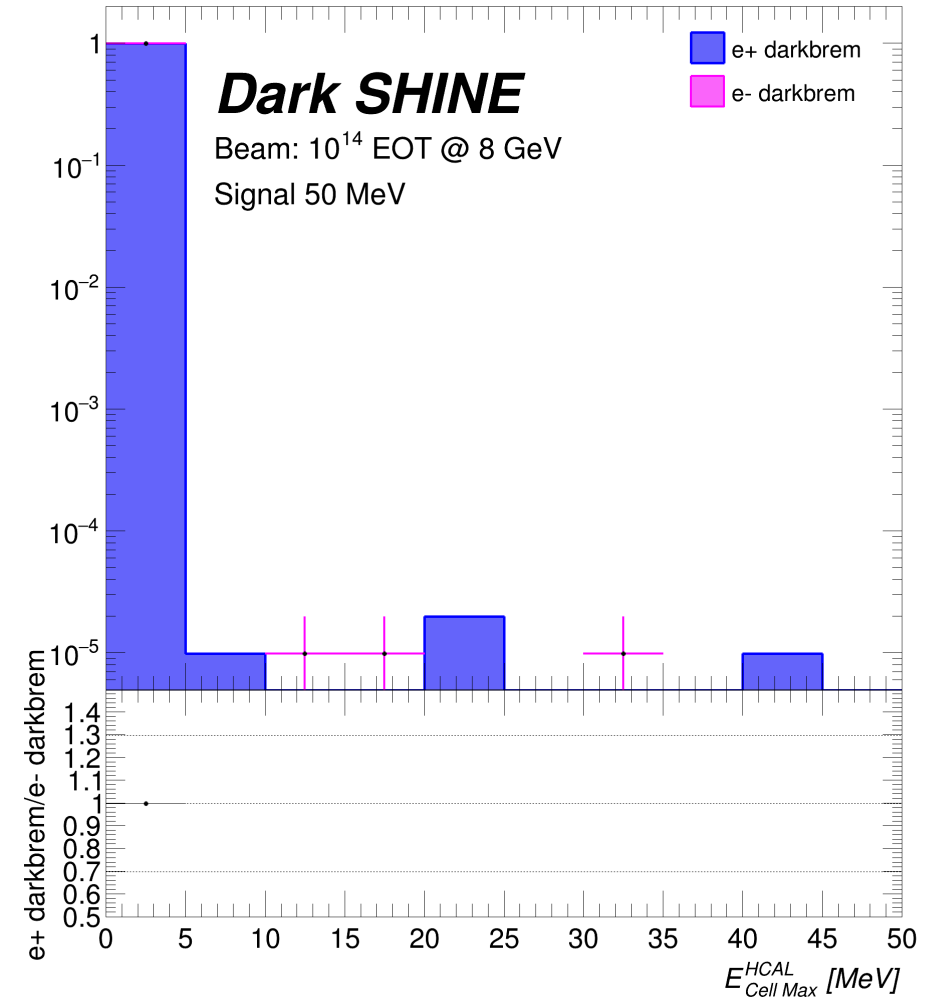
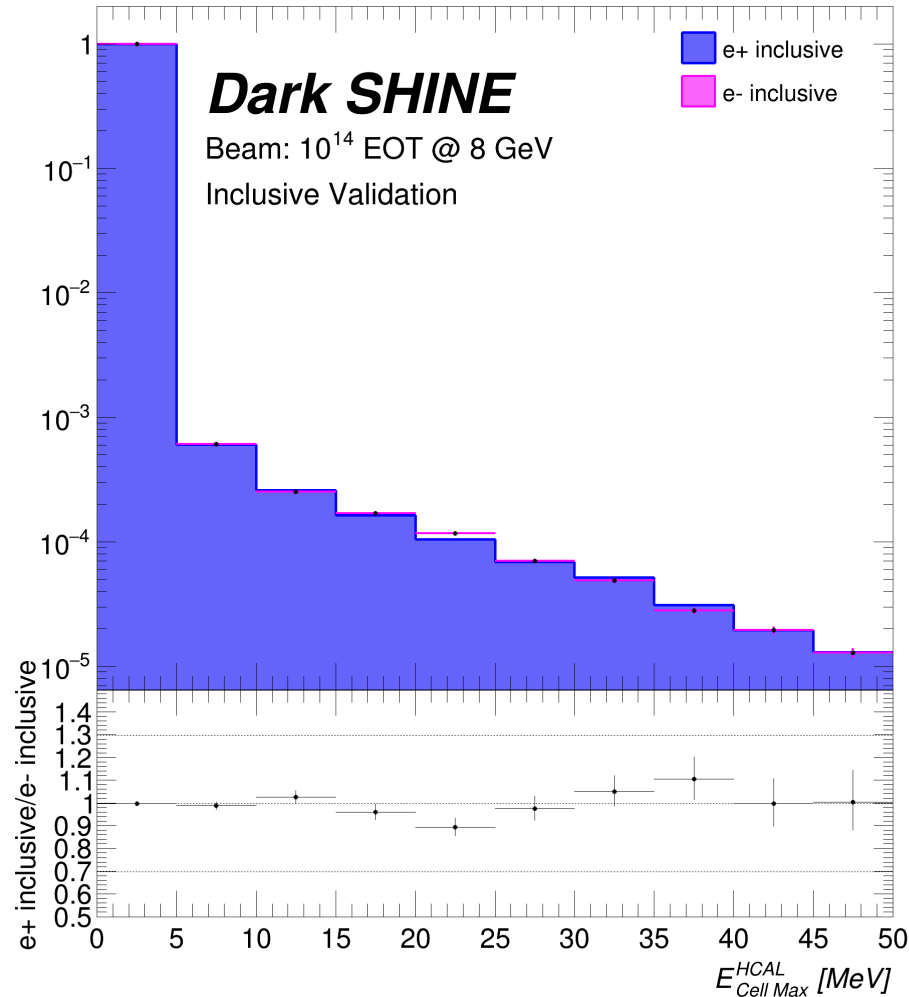
Validation: e^+ vs e^-

ECAL Cluster



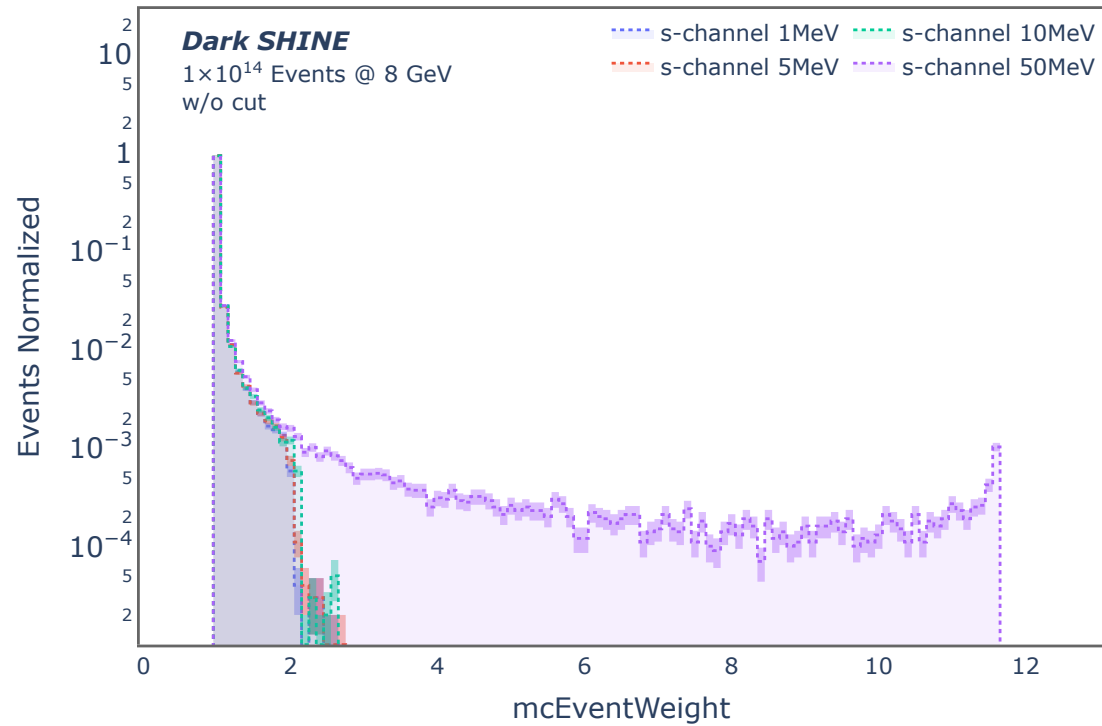
Validation: e^+ vs e^-

HCAL truth

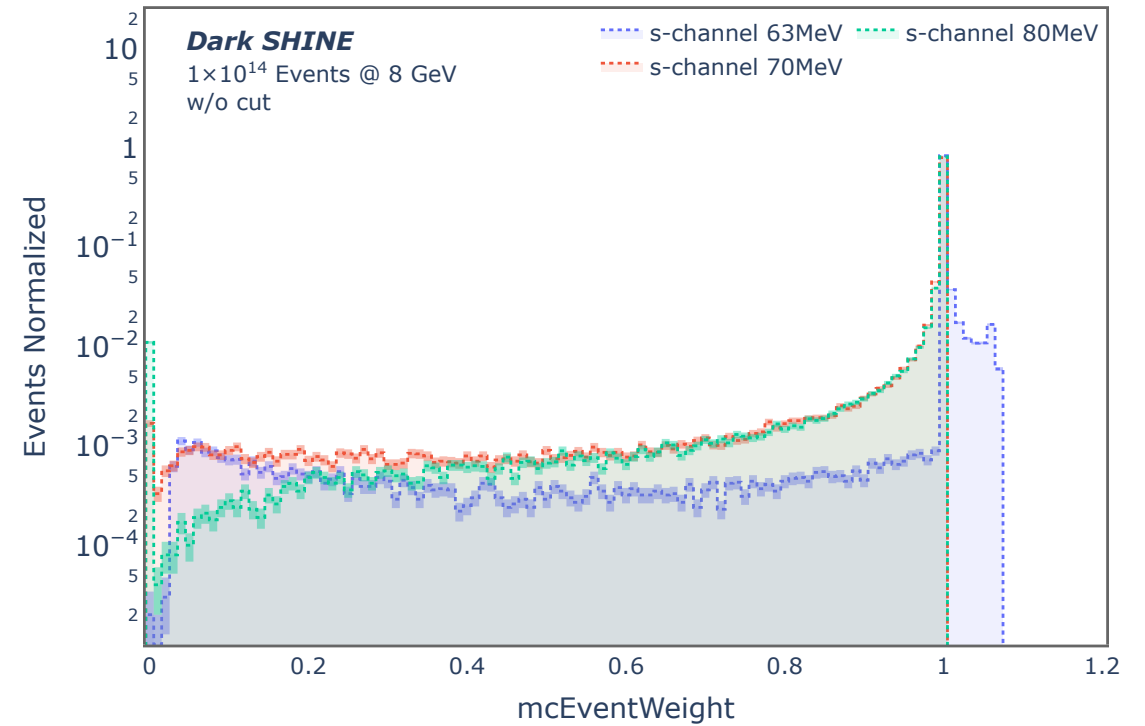


Validation: weight distribution of s-channel signal

$$m_{A'} < 63\text{MeV}, w_{MC} > 1$$



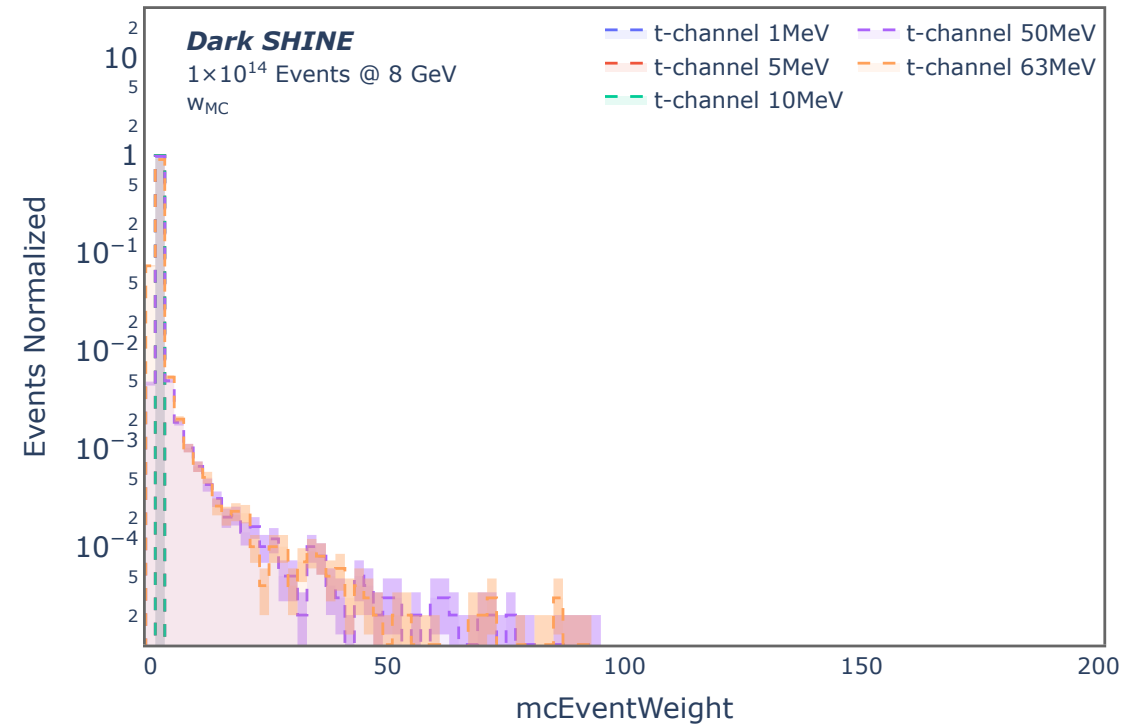
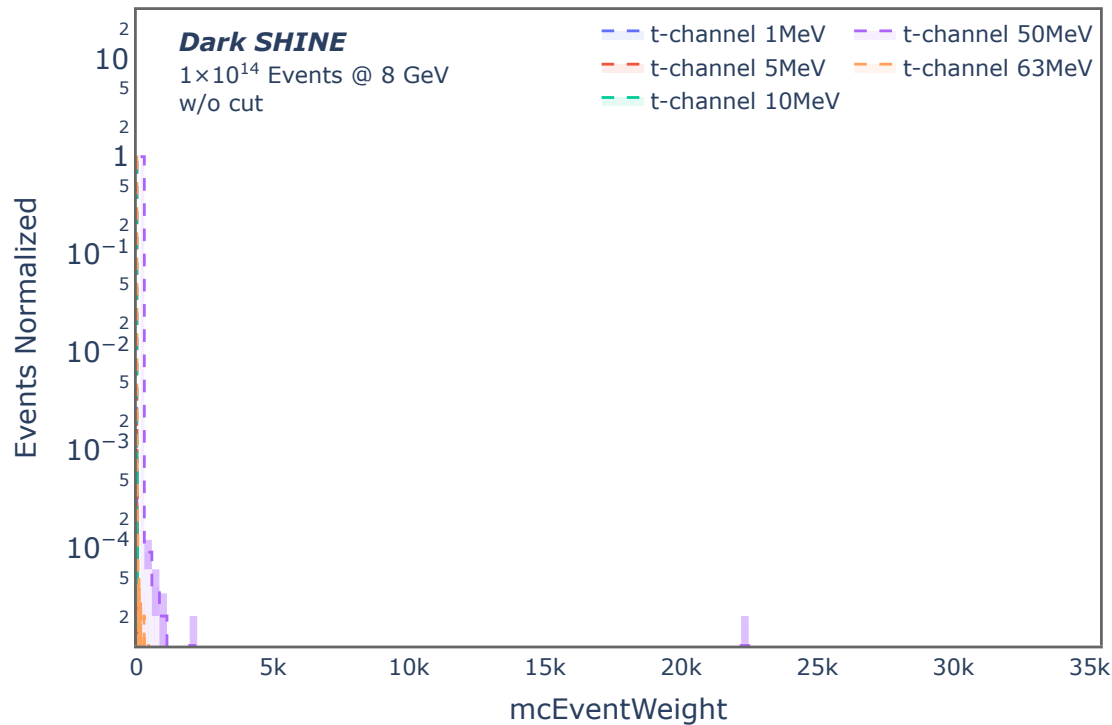
$$m_{A'} > 63\text{MeV}, w_{MC} < 1$$



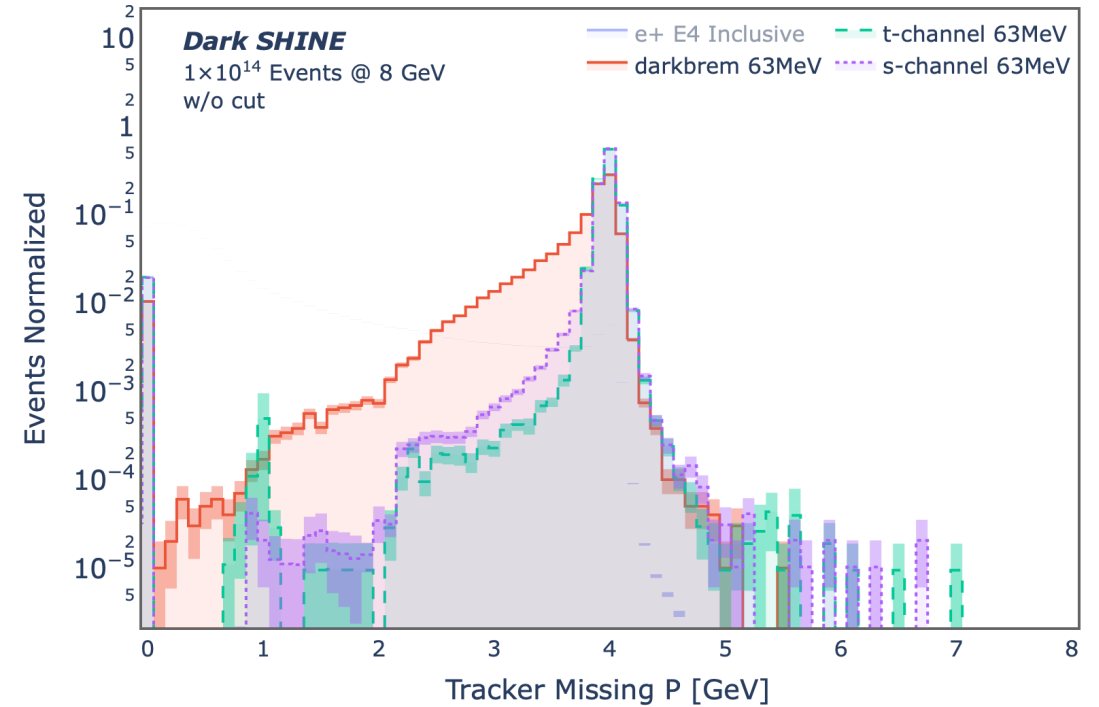
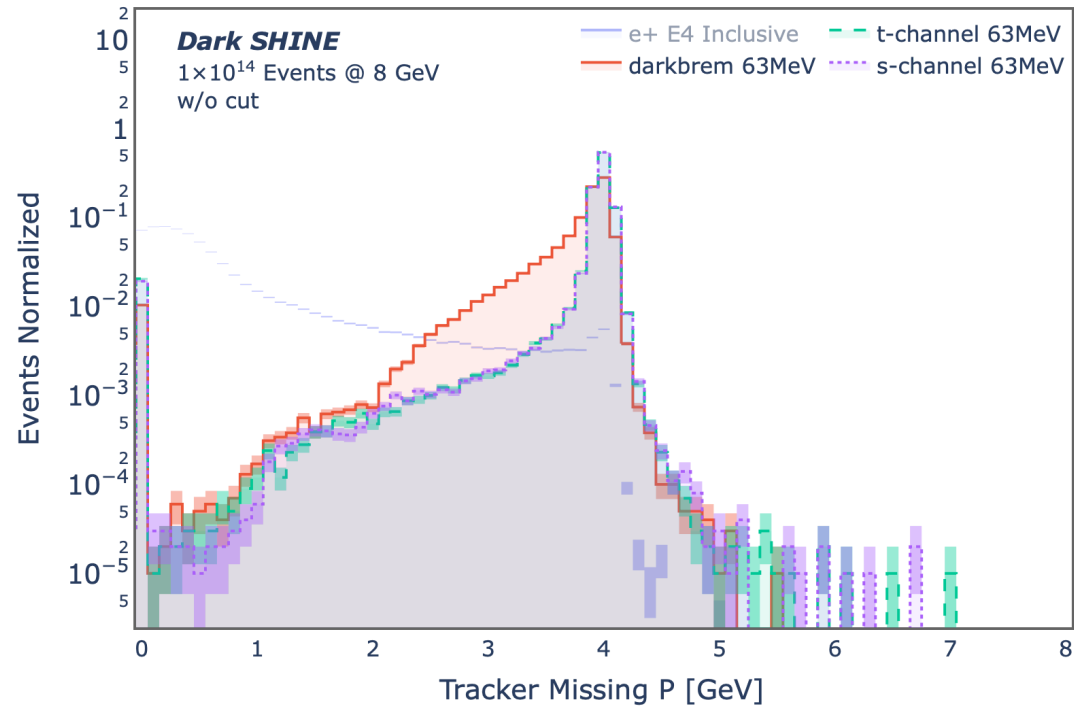
Validation: weight distribution of t-channel signal

Found some high weight with low statistics

$$w_{MC} < 200$$

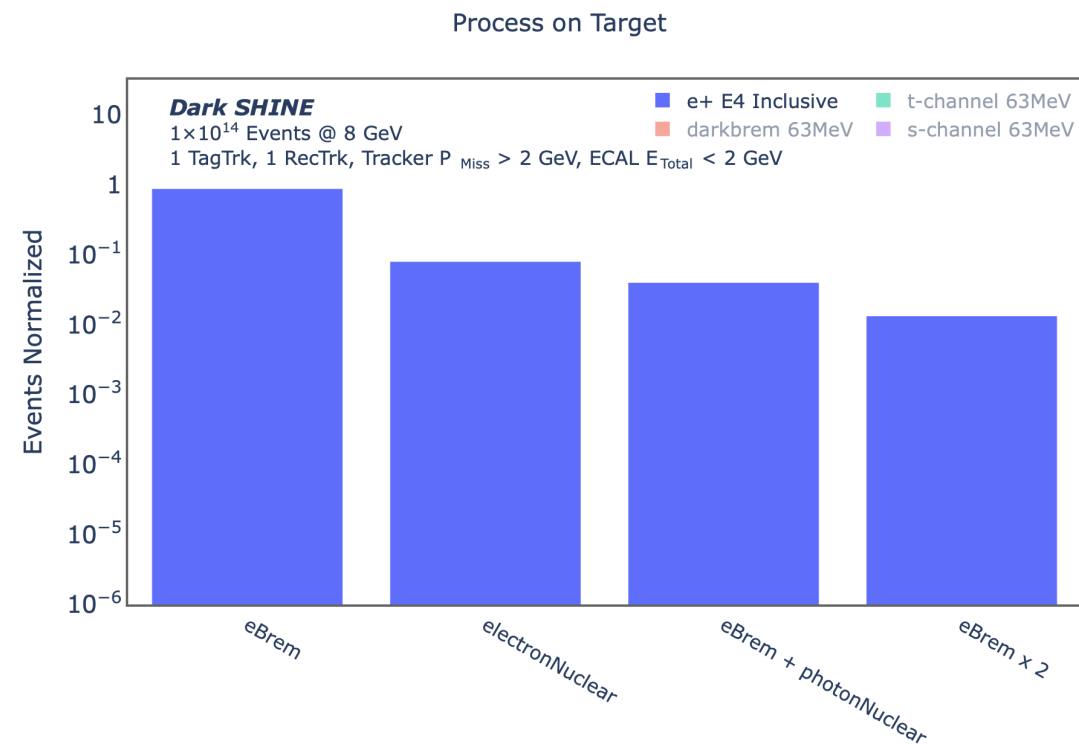
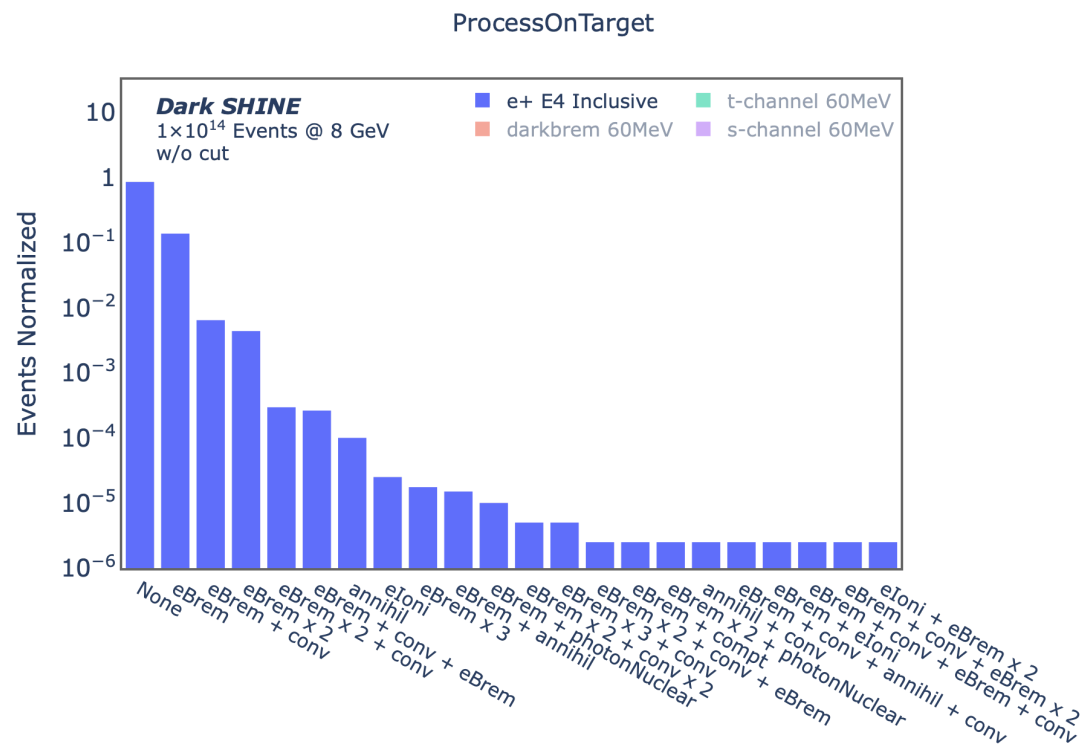


Validation: w/o weight vs w/ weight



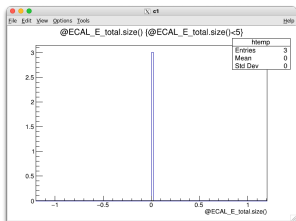
Validation: Process Type

full ; brem* region



Todo:

- Minor bug (only in positron brem signal, not found in other background / positron signal): Empty ECAL collection (3 / 1e5)



- 1 week:
 - Validation:
 - Investigate e+ events with **low tracker P / ~0 missing P**
 - Validation: $w - E_0$ curve for MC / formula
 - Signal region definition [done]
 - Cut optimization (scan)
 - Limit setting
- Further
 - Bias Factor / rare process production

Thanks

Documentations / GitHub Repo

Backup

