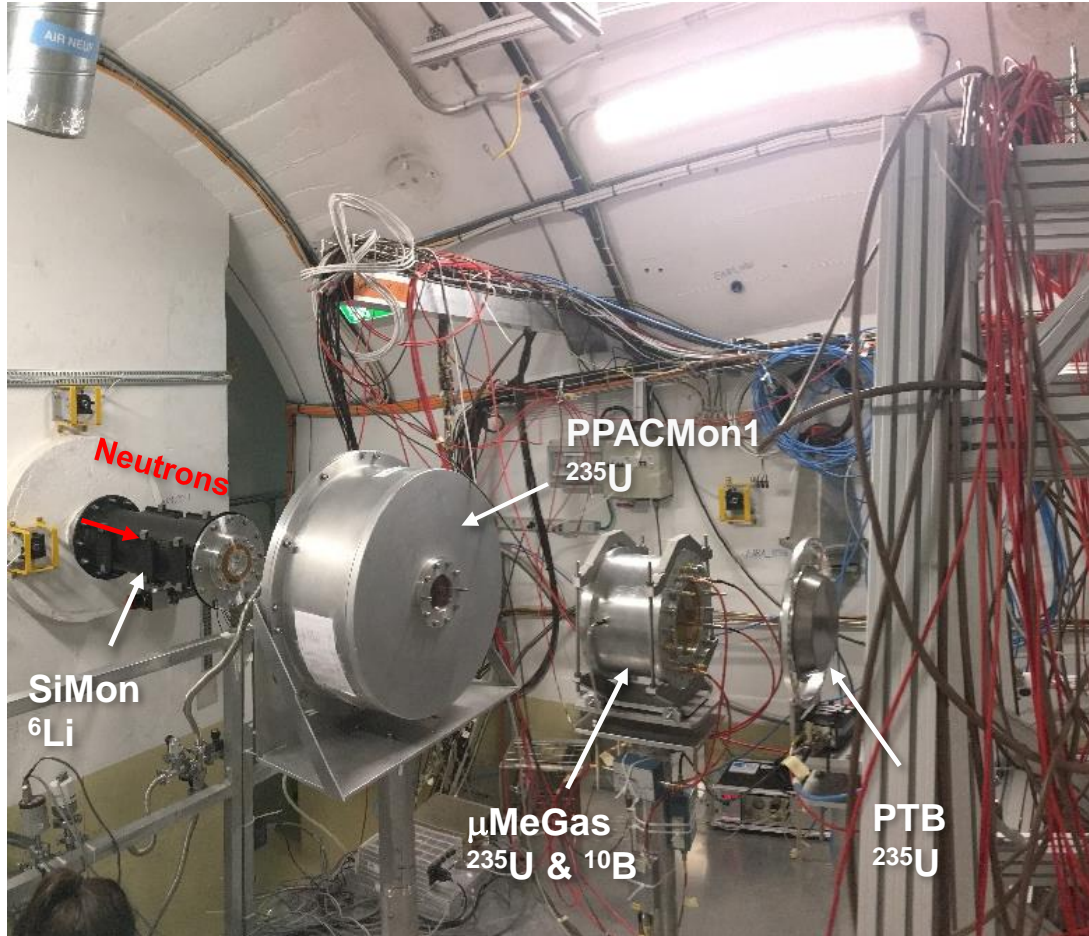




# Status of the Phase-4 EAR1 flux evaluation

S. Amaducci, M. Bacak, F. Garcia-Infantes, N. Kyritsis, A. Manna, E. Musacchio, N. Patronis, J. Pavon-Rodriguez, M. Sabate-Gilarte, M. E. Stamati, R. Zarrella

# Flux setup



+ Gold foil activation

	Reaction(s)	Mass ( $\mu\text{g}/\text{cm}^2$ )	Energy Rol (eV)
SiMon	${}^6\text{Li}(n,\alpha){}^3\text{H}$	600 (95% ${}^6\text{LiF}$ ) ( $\pm 20\%$ )	$25 \cdot 10^{-3} - 10^6$
PPACMon1	$2x {}^{235}\text{U}(n,f)$	278.5 ( $\pm 1\%$ ) 298.4 ( $\pm 1\%$ )	$25 \cdot 10^{-3}$ $0.15 \cdot 10^6 - 10^9$
$\mu\text{MeGas}$	${}^{10}\text{B}(n,\alpha){}^7\text{Li}$ ${}^{235}\text{U}(n,f)$	24.5 (80% ${}^{10}\text{B}_4\text{C}$ ) ( $\pm 20\%$ ) 281.4 ( $\pm 1.1 \mu\text{g}/\text{cm}^2$ )	$25 \cdot 10^{-3}$ $0.15 \cdot 10^6 - 10^9$
PTB	$10x {}^{235}\text{U}(n,f)$	$10x 444.3 (\pm 2\%)$	$25 \cdot 10^{-3}$ $0.15 \cdot 10^6 - 10^9$
Gold	$2x {}^{197}\text{Au}(n,\gamma)$	50 $\mu\text{m}$ (upstream) 100 $\mu\text{m}$ (downstream)	4.9

Different thickness  
might be problematic

# Status of the detectors' analyses

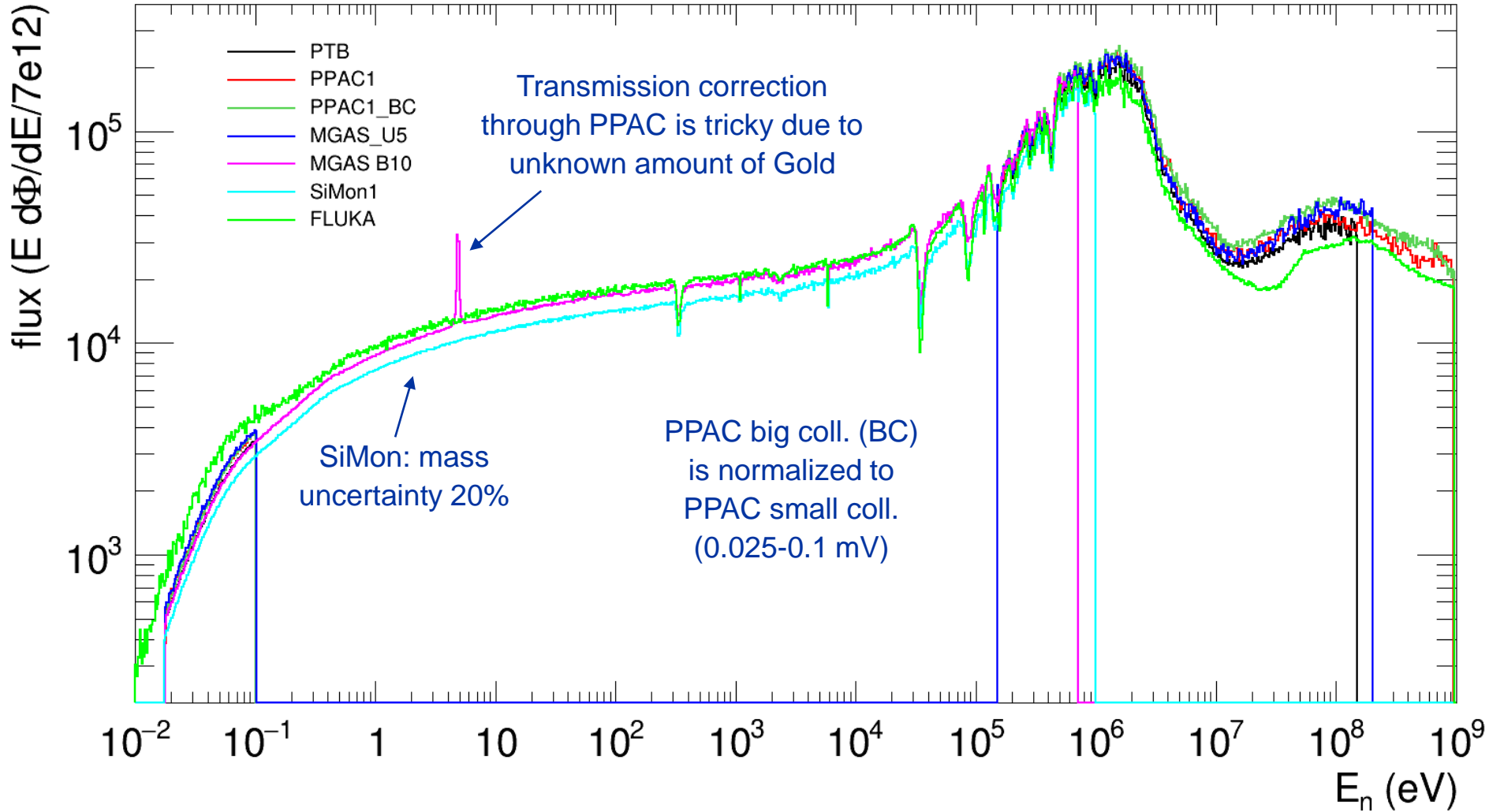
	SiMon	PPACMon1	$\mu$ MeGas	PTB	Gold
PSA	✓	✓	✓	✓	n/a
Gain drifts	✓	n/a	✓	✓	n/a
Pile-Up	✓	✓	✓	✓	n/a
Efficiency	✓	✓	~	✓	✓
HE / anisotr.	n/a	✗	✗	~	n/a
Transmission	n/a	✗	~	~	✗

# TOF 2 Energy

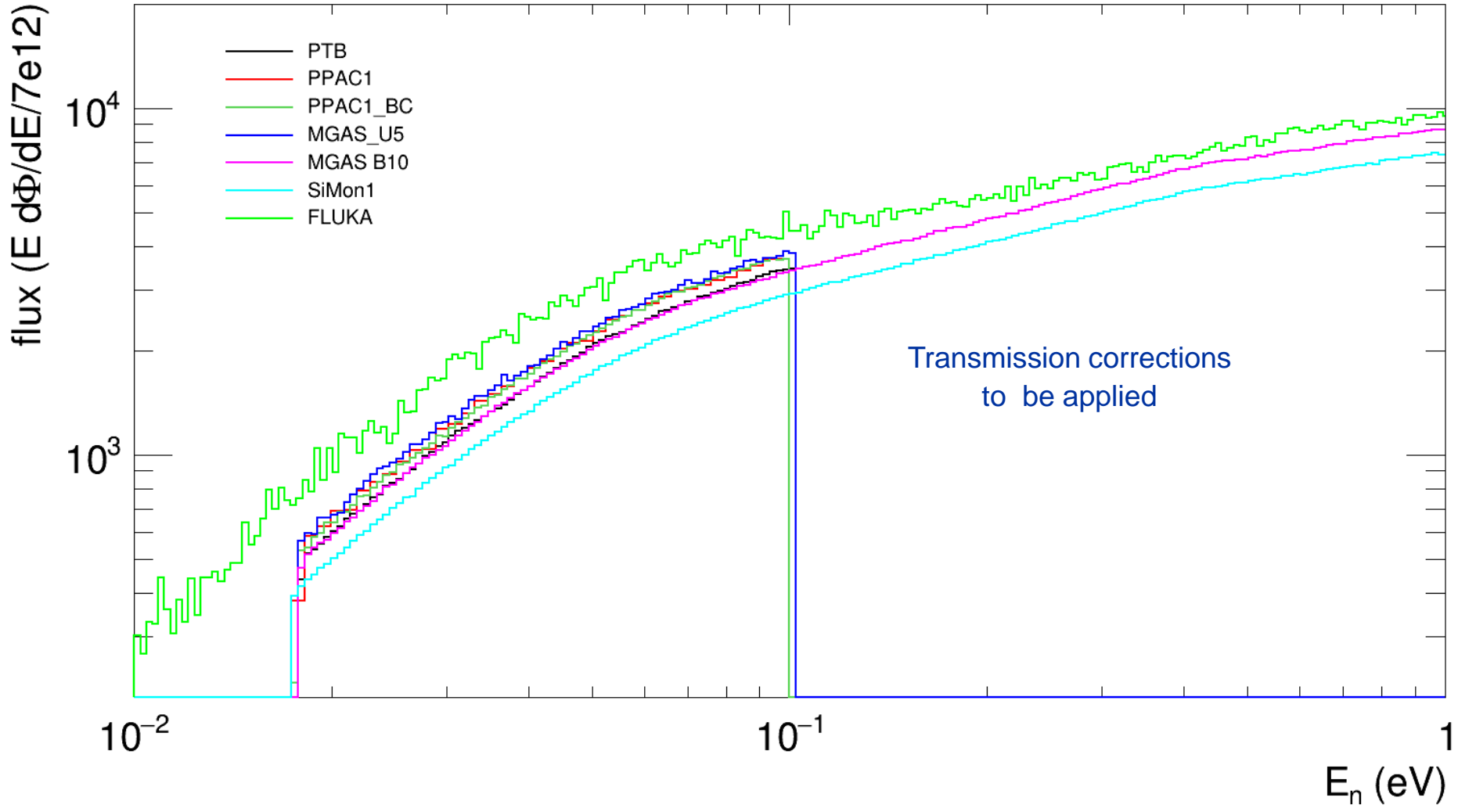
All detectors used a fixed flight path for all TOFs in the conversion from TOF to energy

$$L(TOF) = L_0 + \lambda^{eff}(TOF) = L_0 + \lambda_{const}^{eff} = L_{const}$$

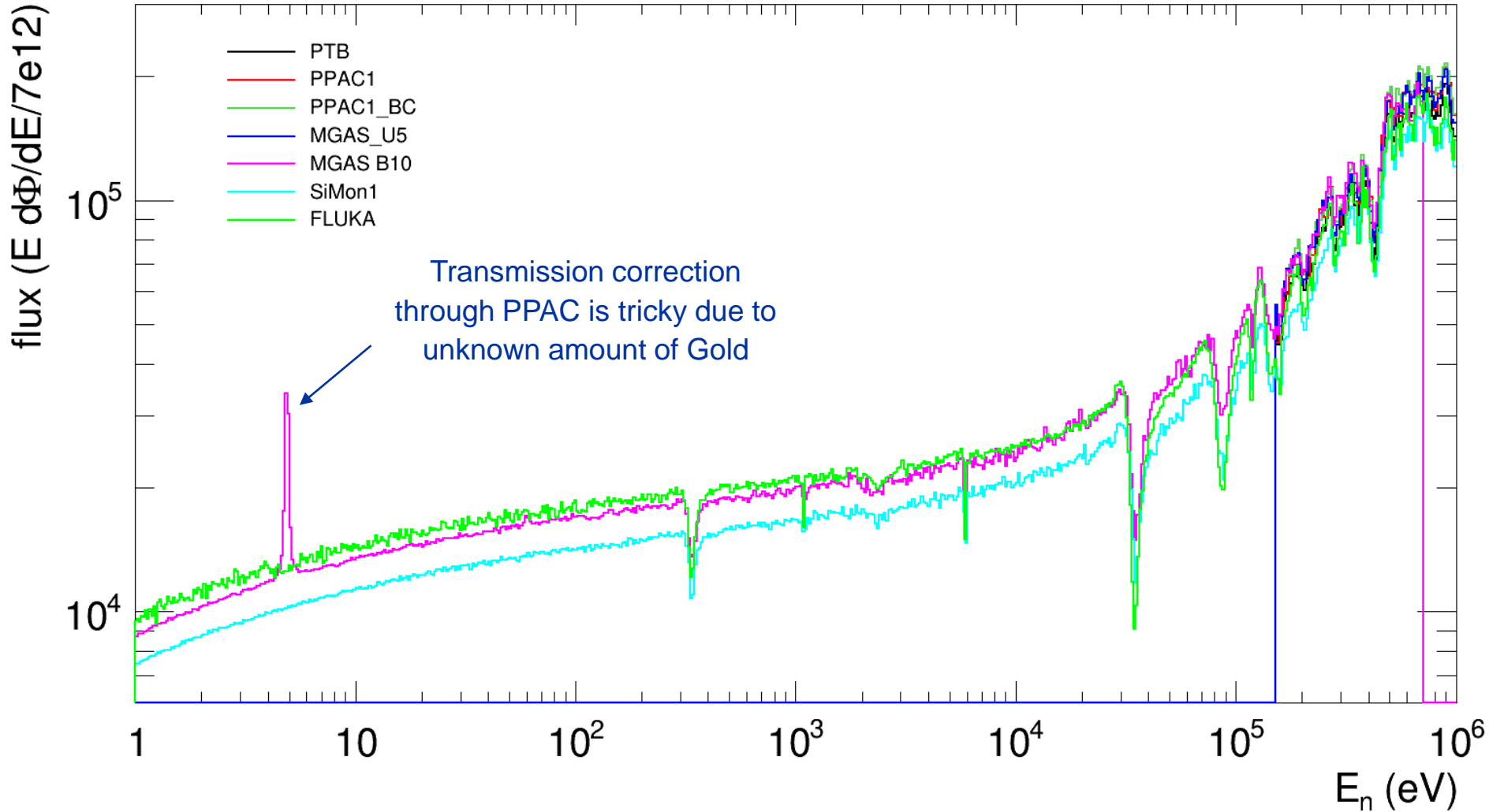
# Flux per detector with available corrections



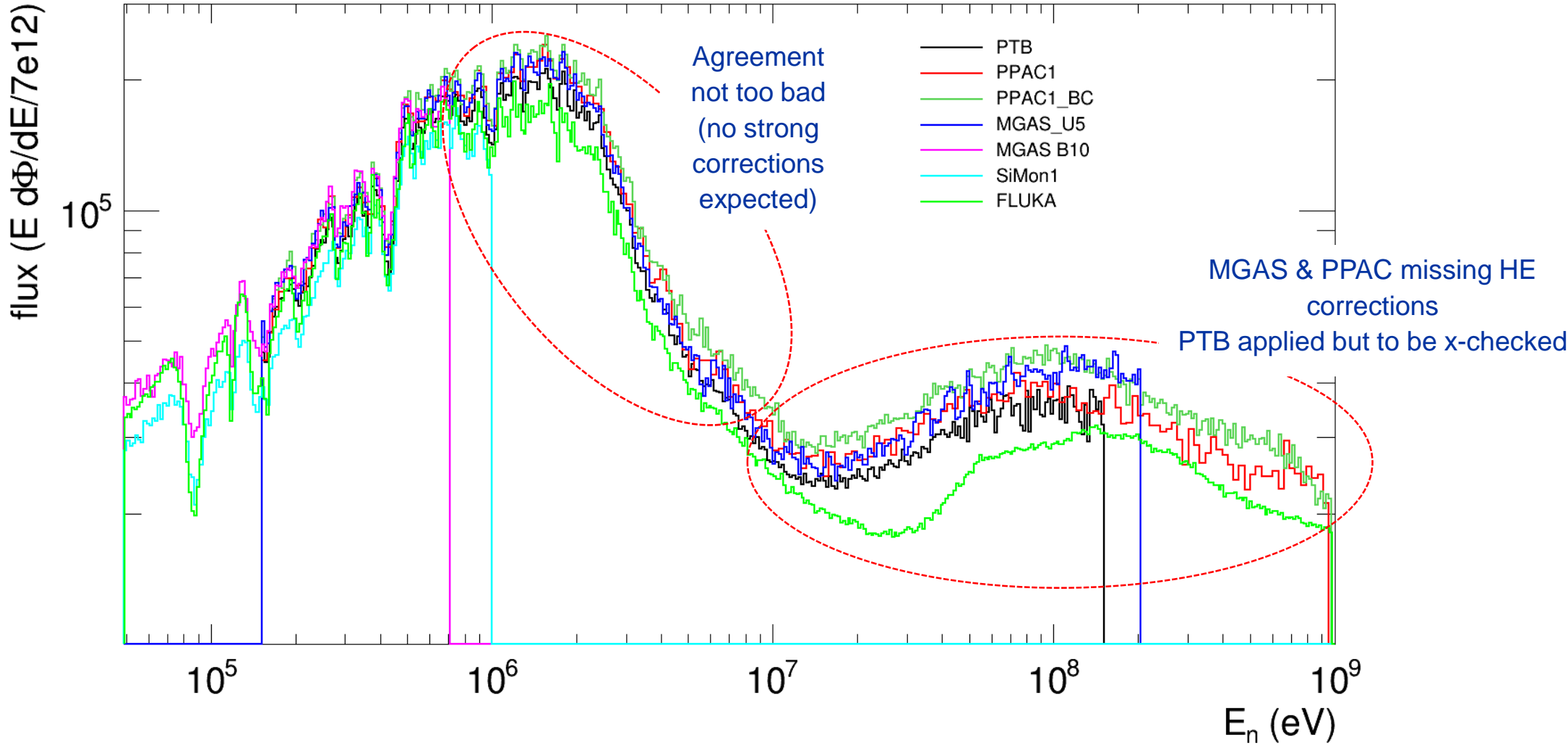
# Flux per detector with available corrections (LE)



# Flux per detector with available corrections (ME)



# Flux per detector with available corrections (HE)

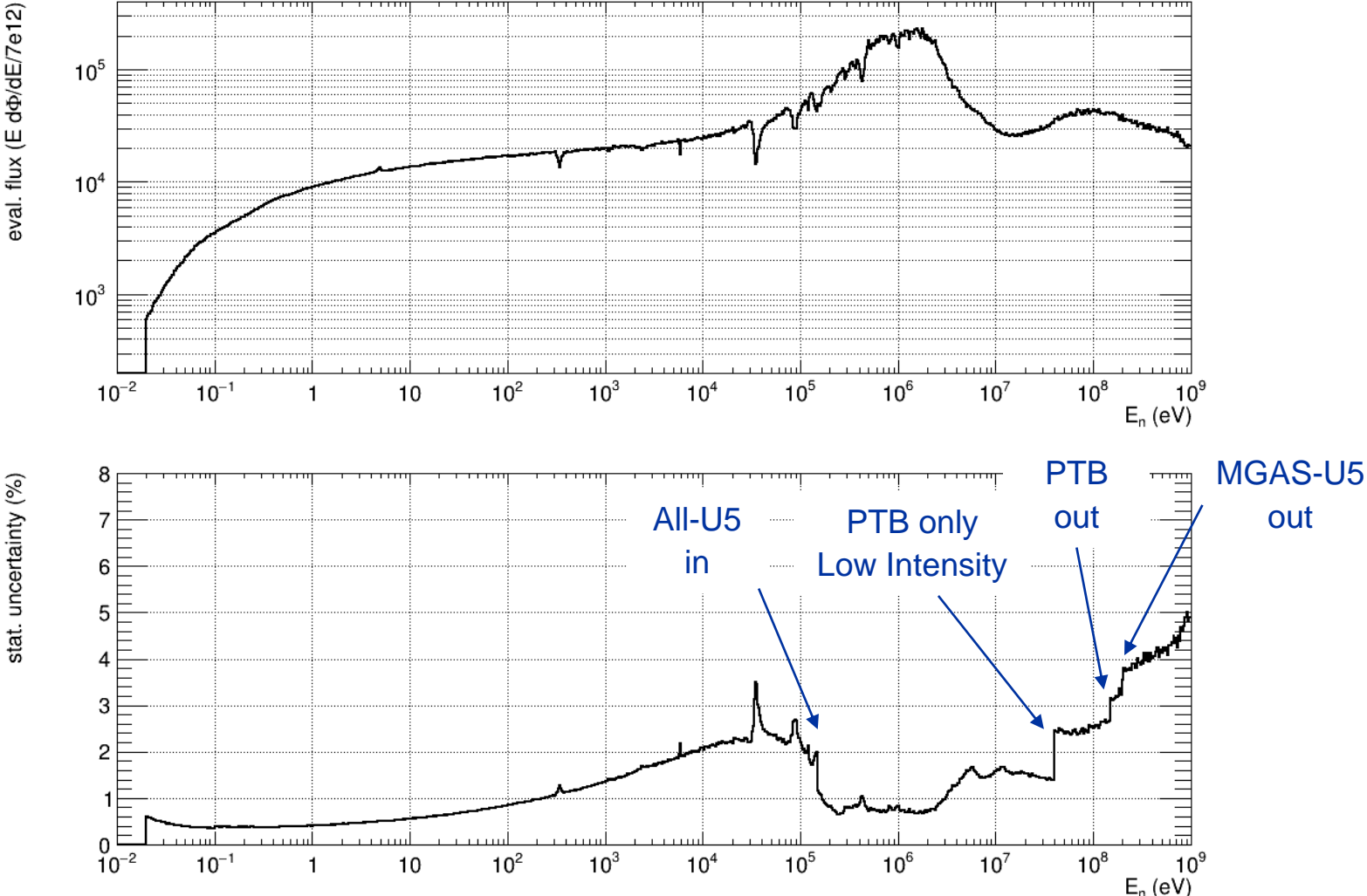




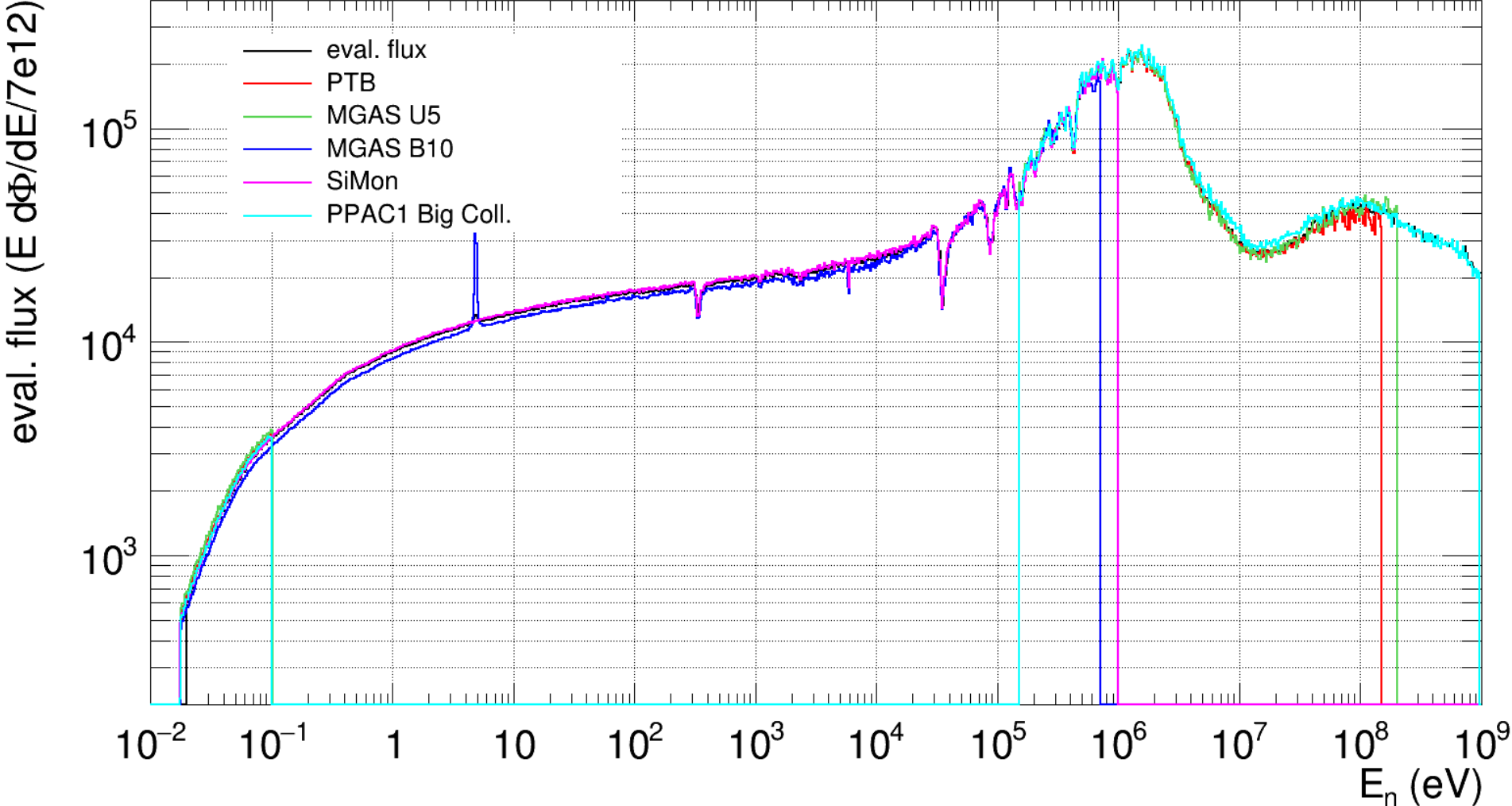
# The way to go...

- **Wait until**
  - Analysis for all detectors is finished
  - Corrections are applied
- **Most trustful seems to be the MGAS U5 (x-check with Au activation)**
  - Mass well known & efficiency for all energy regions can be well established
  - Scale all detectors to MGAS-U5 – which energy region though?
    - LE (25-100 meV) – transmission corrections need to be precise (see Au correction) & PPAC big collimator data is out (BIF)
    - U5 fission integral (7.8-11 eV) – strong transmission corrections renders this impossible for PTB (Pt, Ta)
    - ME (300-500 keV) – overlap for all detectors in a non flat part of the flux
    - HE (1-2 MeV) – „flat“ flux but no MGAS-B10/SiMon
- **First attempt: all detectors scaled to MGAS-U5 in ME (300-500 keV)**

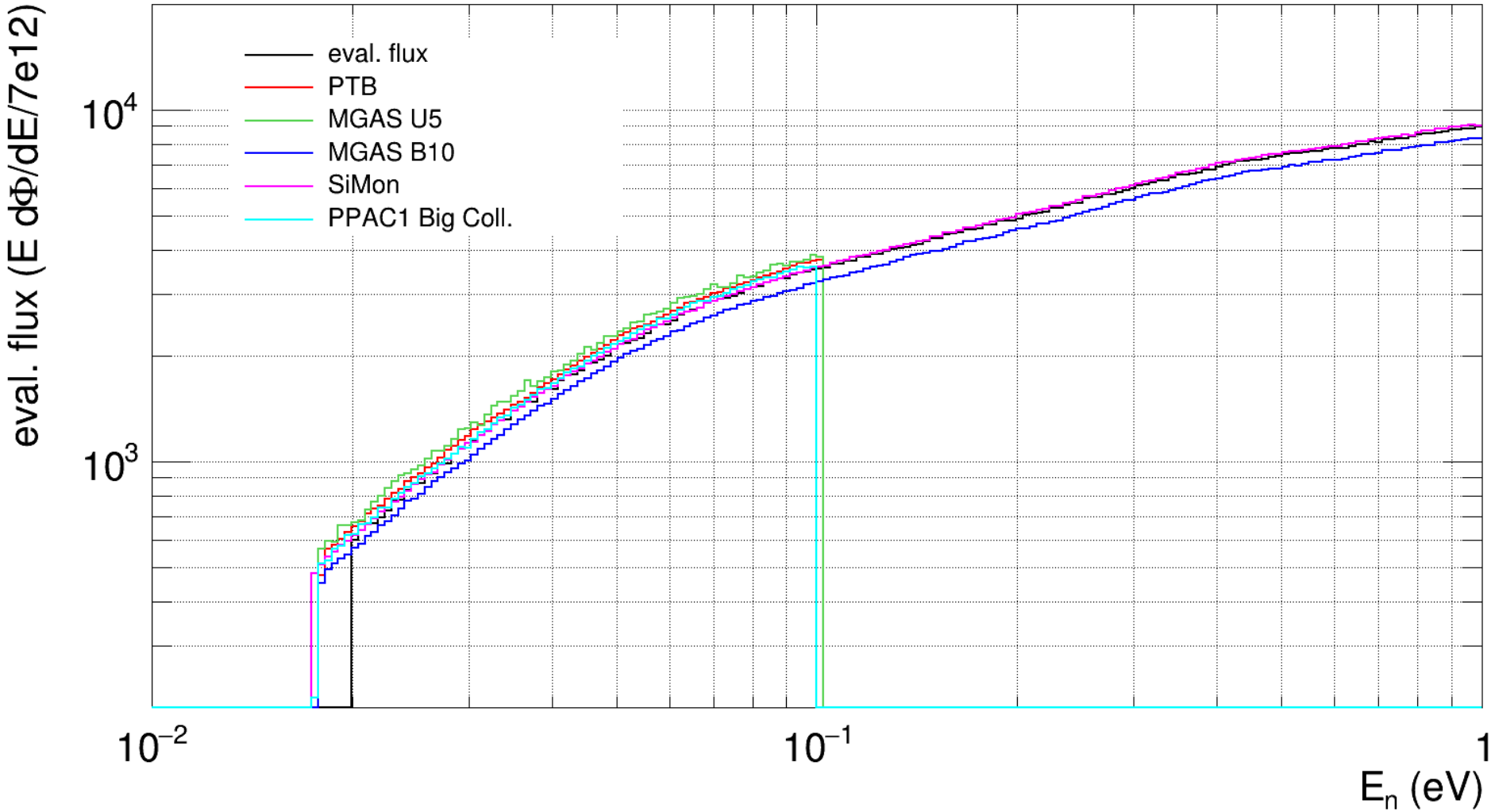
# Eval. Flux from detectors scaled to MGAS-U5 (300-500 keV)



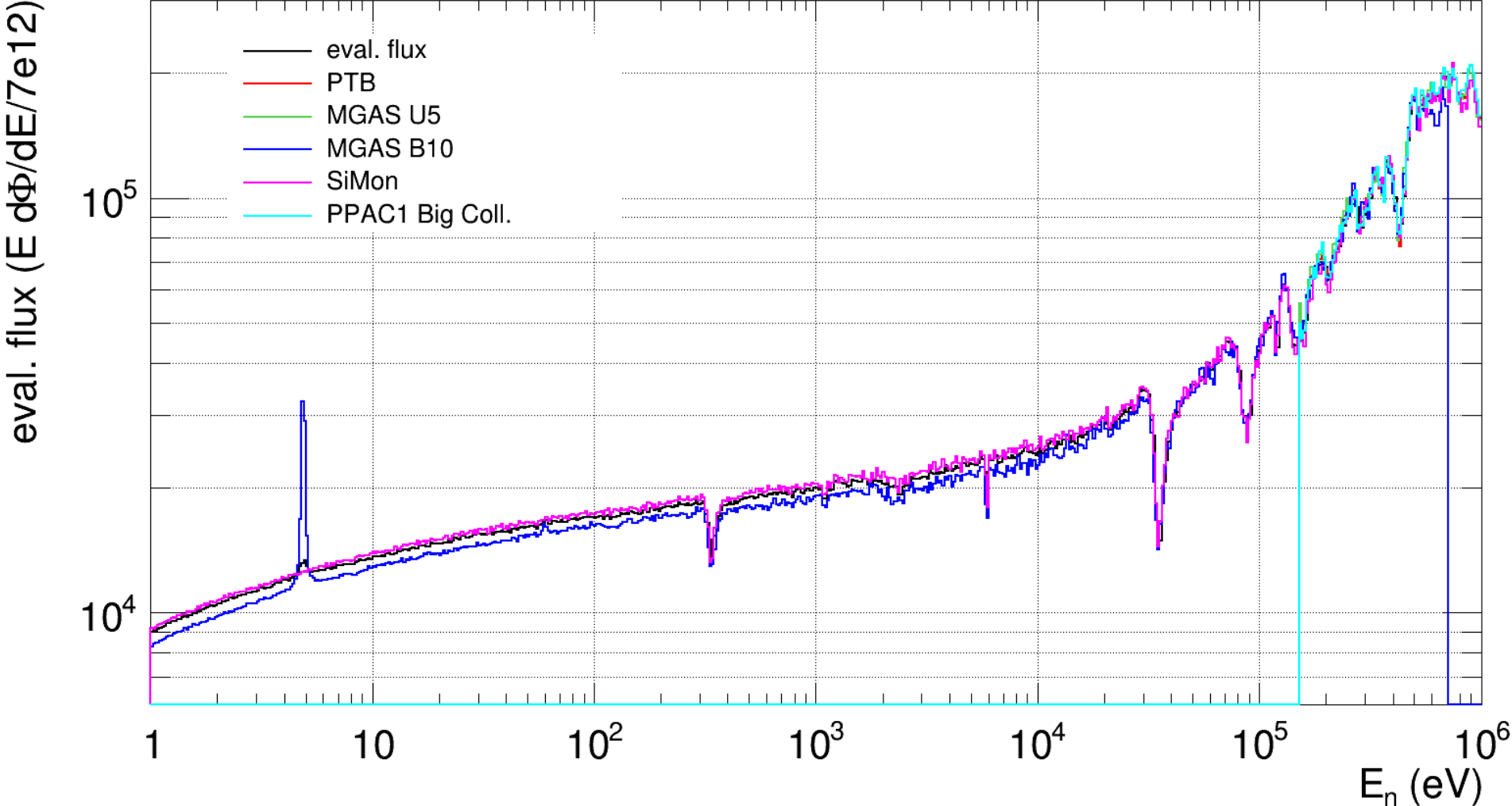
# Eval. Flux from detectors scaled to MGAS-U5 (300-500 keV)



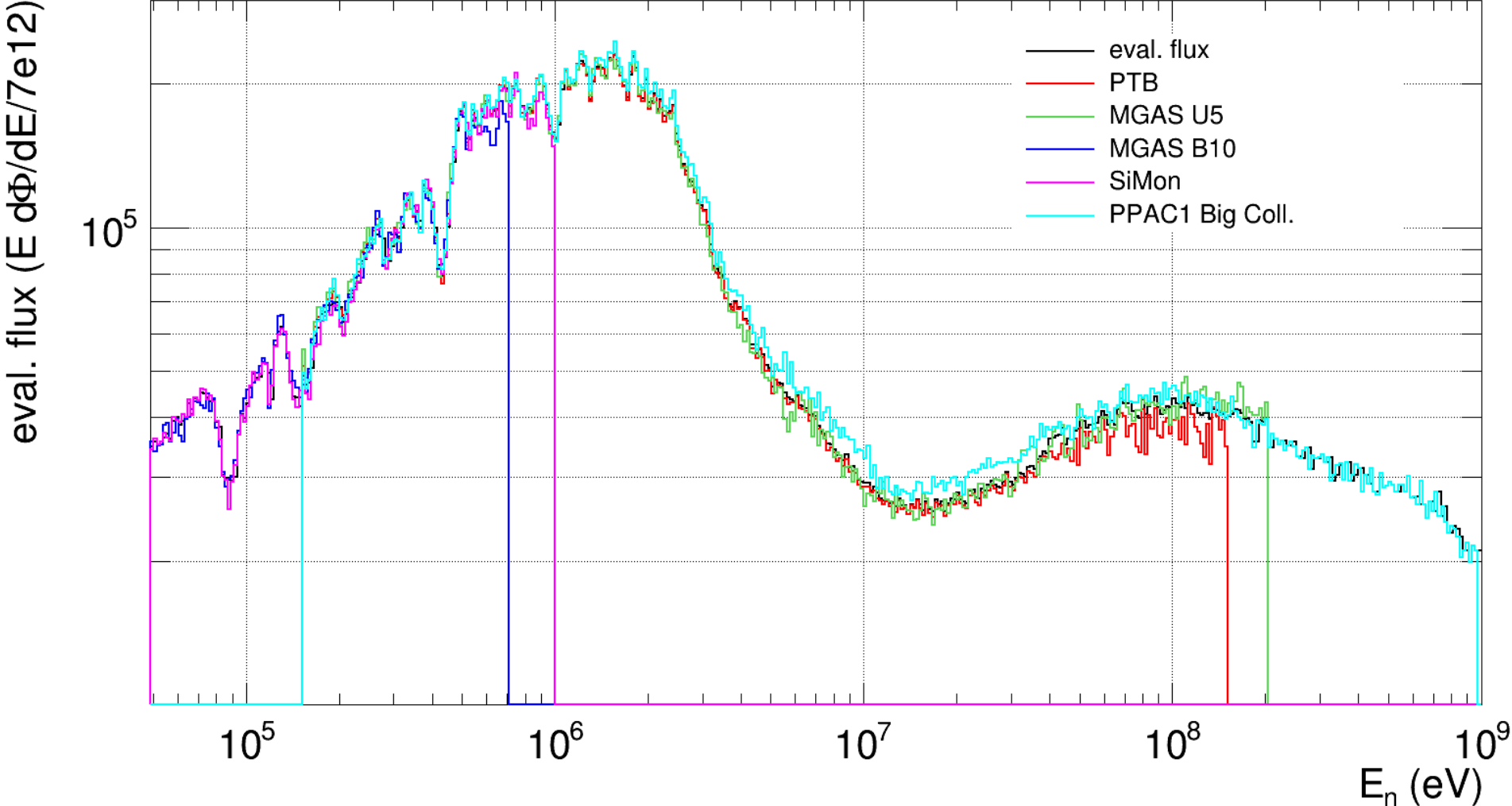
# Eval. Flux from detectors scaled to MGAS-U5 (300-500 keV) (LE)



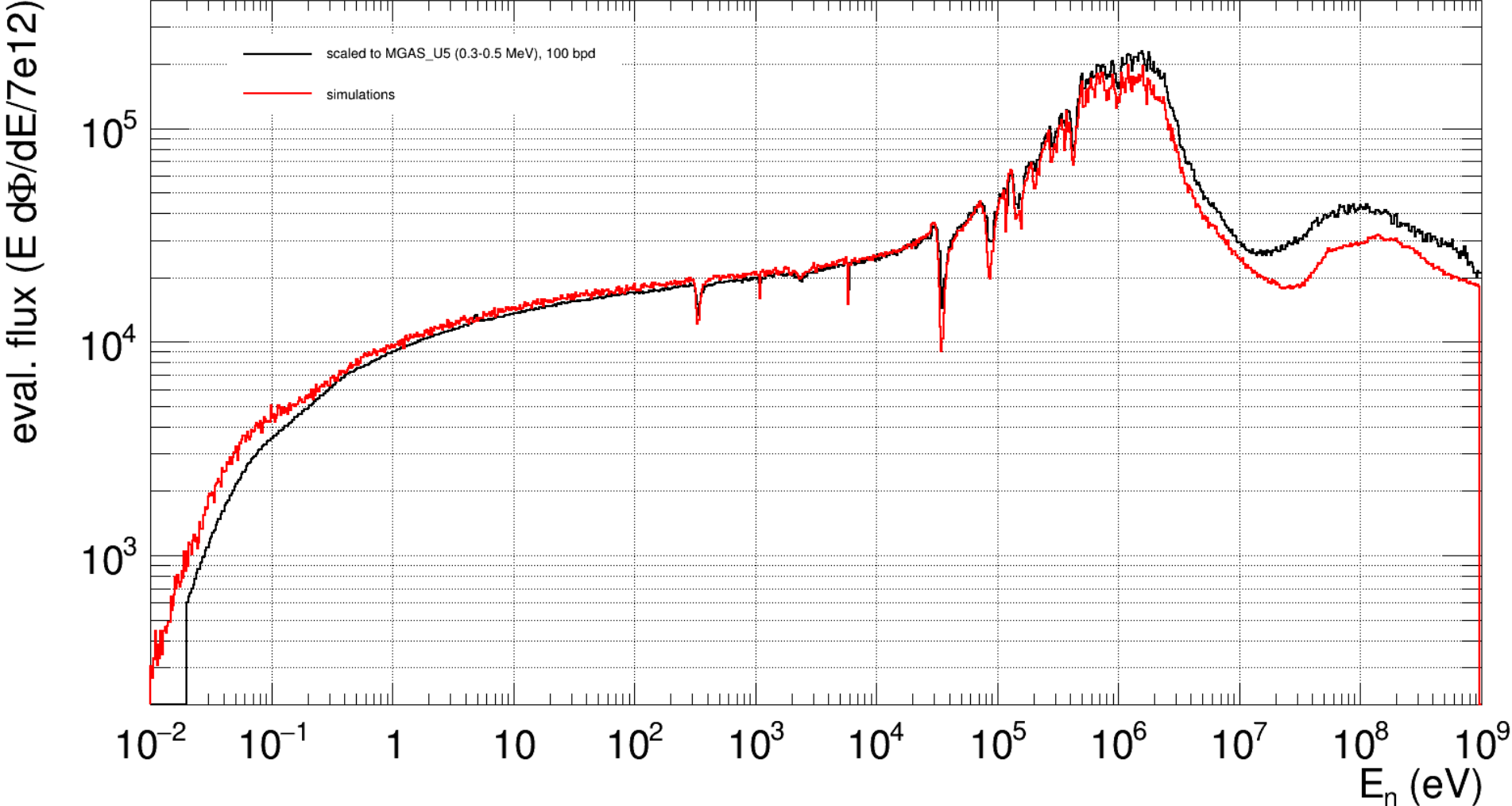
# Eval. Flux from detectors scaled to MGAS-U5 (300-500 keV) (ME)



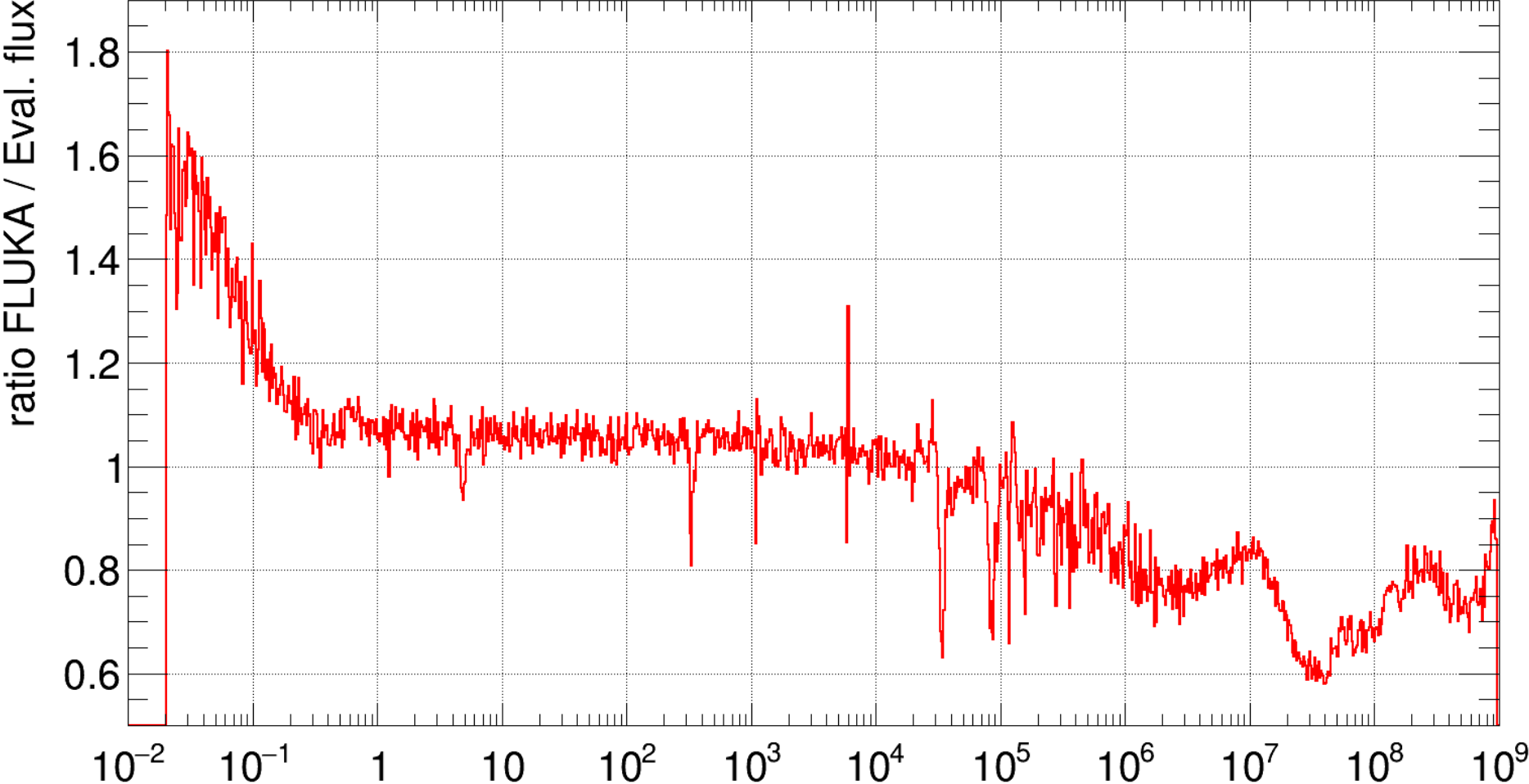
# Eval. Flux from detectors scaled to MGAS-U5 (300-500 keV) (HE)



# Eval. Flux vs FLUKA



# Eval. Flux vs FLUKA – ratio





# Summary & outlook

- **First evaluation performed on partially finished detector data**
- **Further evaluation on hold until final detector analysis**
  - Potentially repeat the Au measurement
  - Deadline for final data reduction for all detectors is **mid February**
- **First final evaluation – end February 2023**
  - Reiteration during February
  - Conclusion by mid March 2023 (before the experimental campaign starts)
- **Final evaluation by end of March 2023**
  - See how the Au fits in



Thanks!

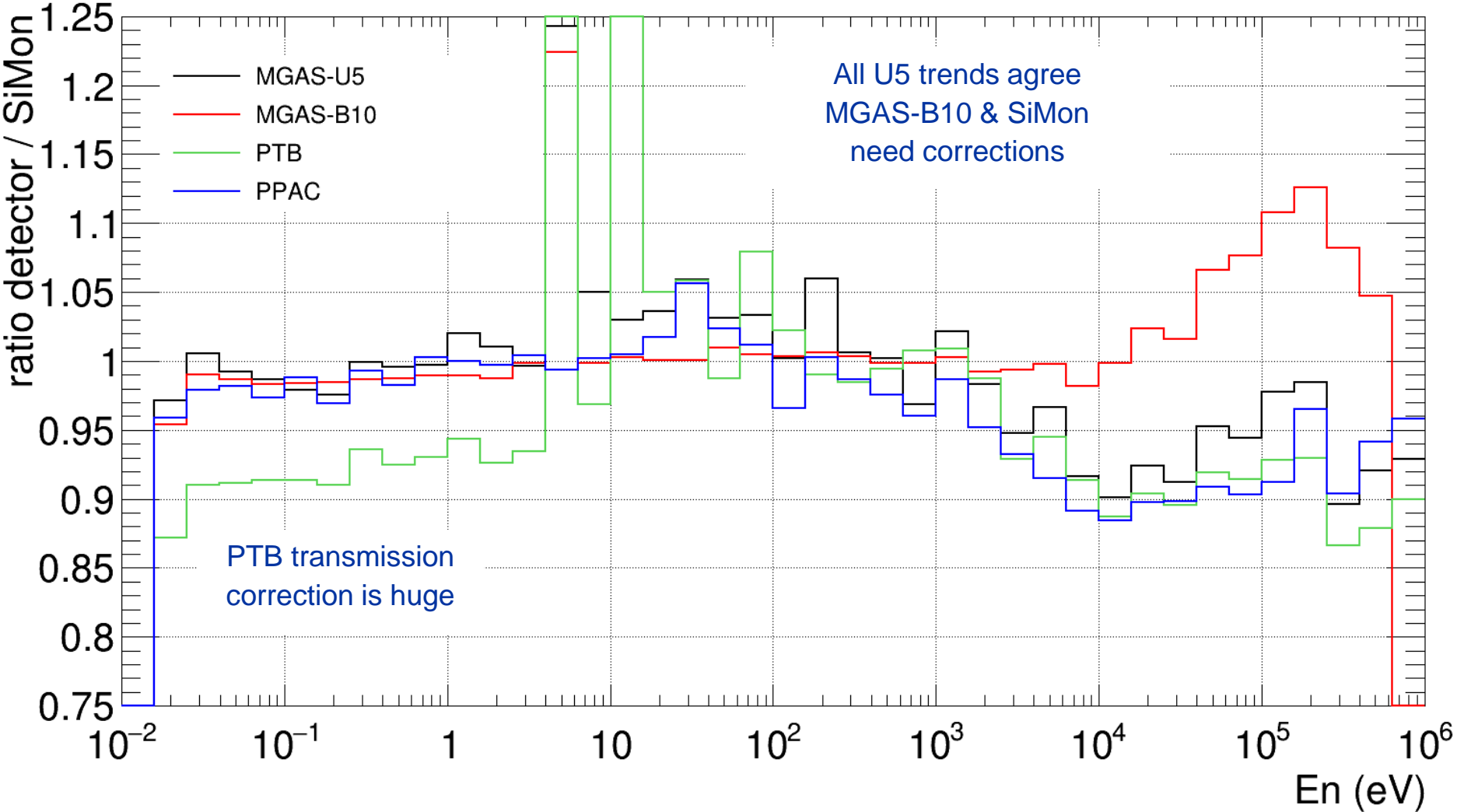
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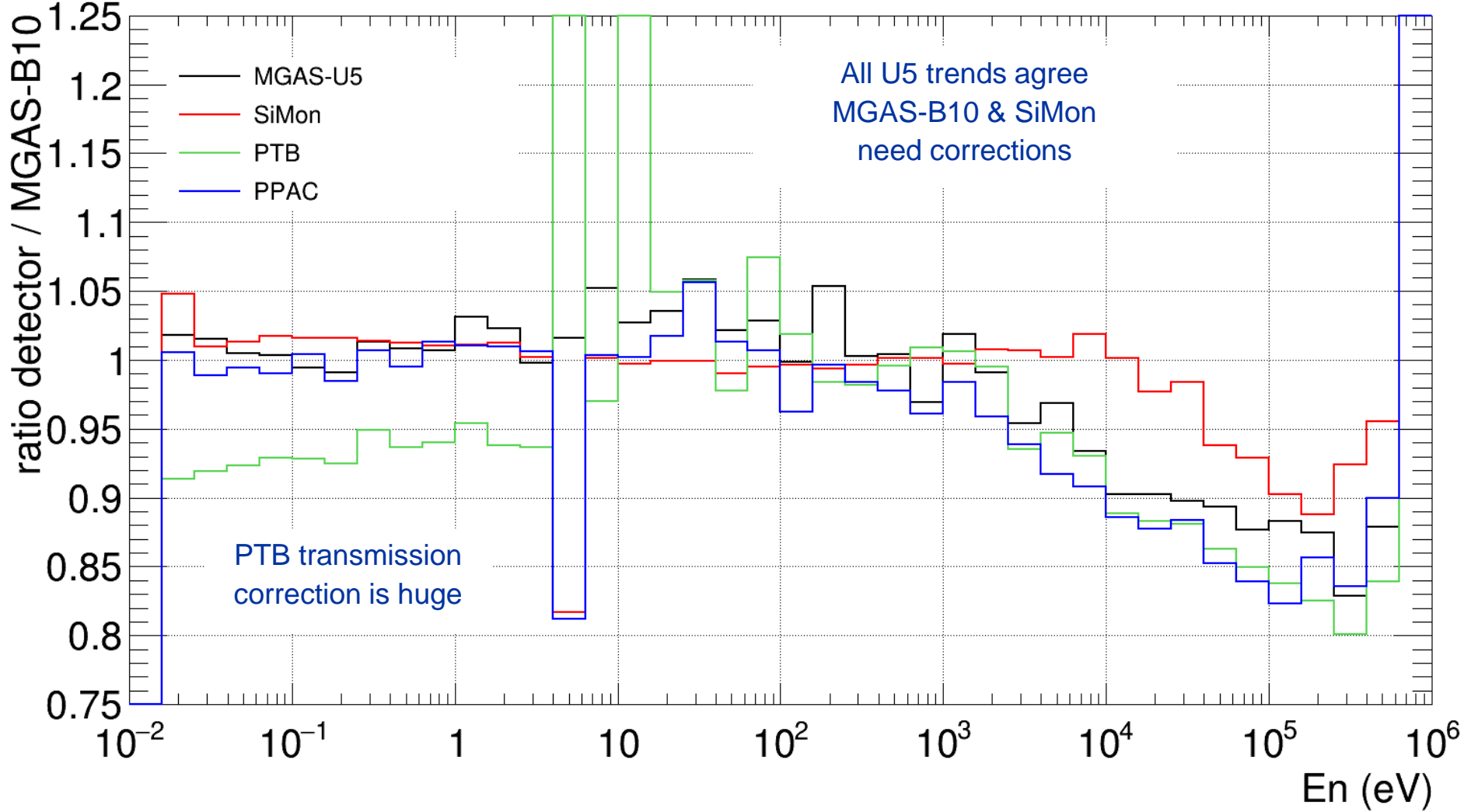




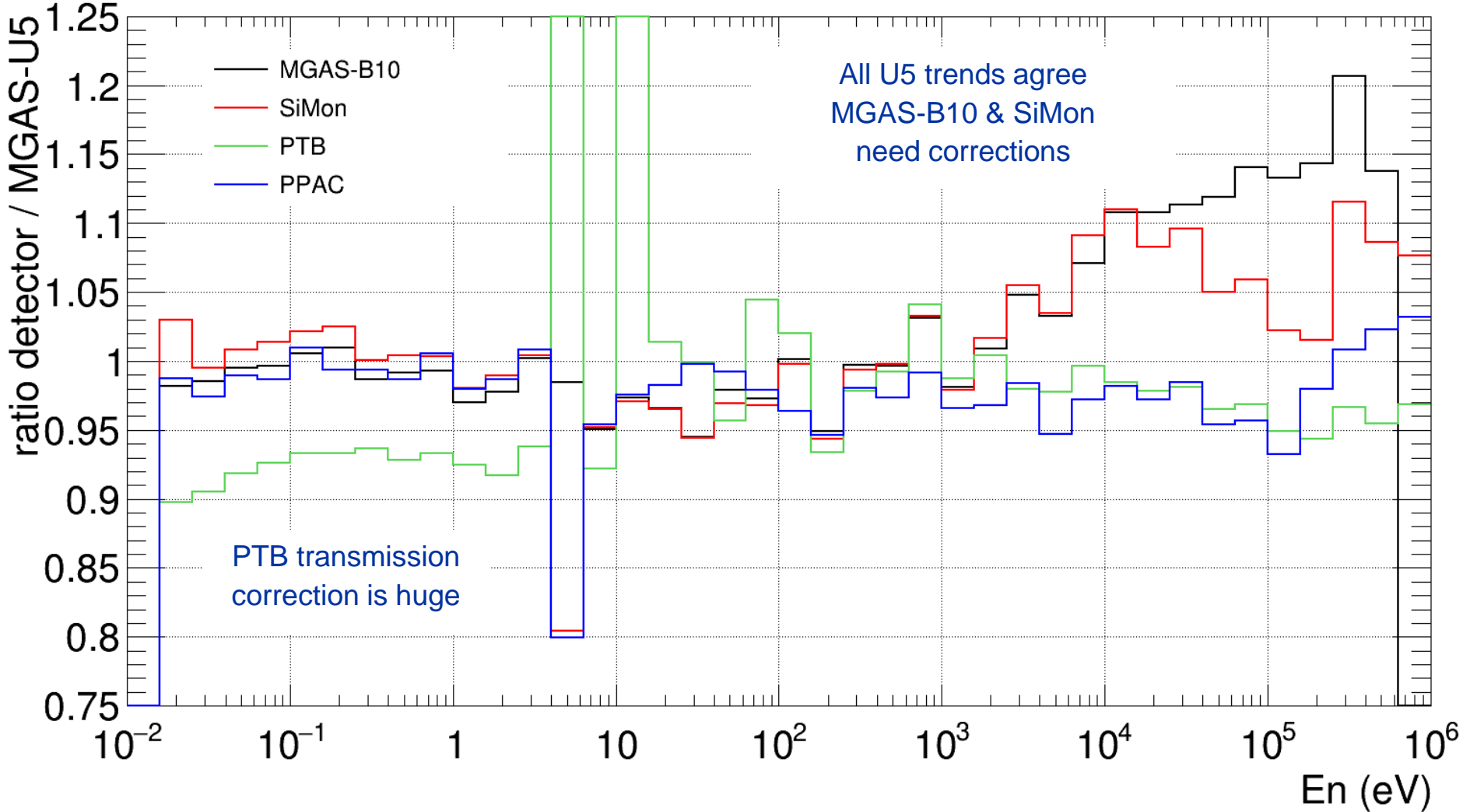
# Ratio to SiMon (scaled at 100-1000 eV)



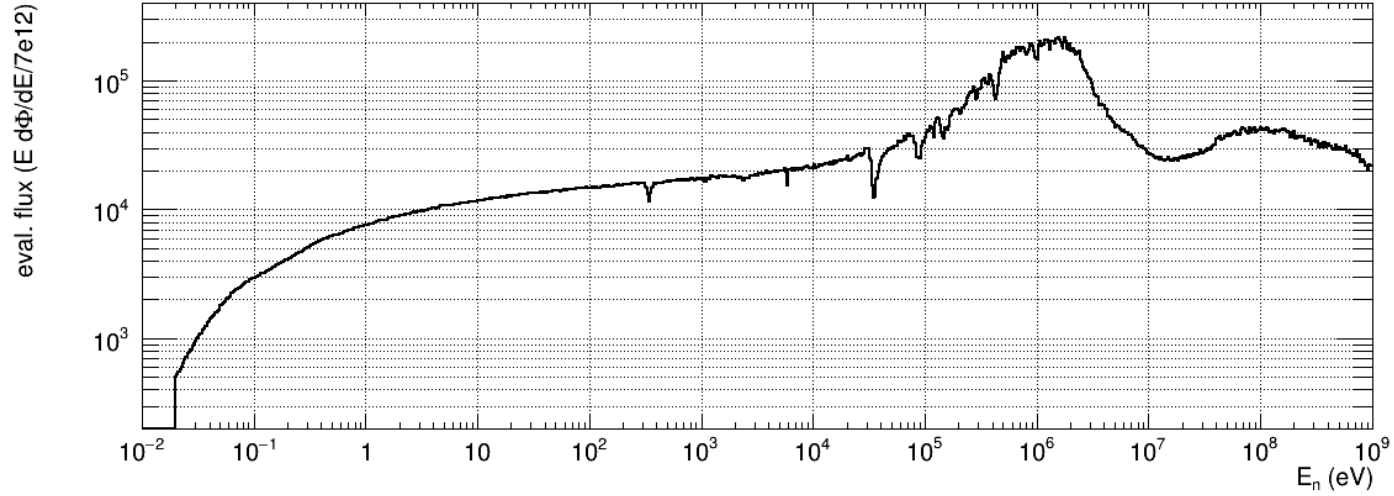
# Ratio to MGAS-B10 (scaled at 100-1000 eV)



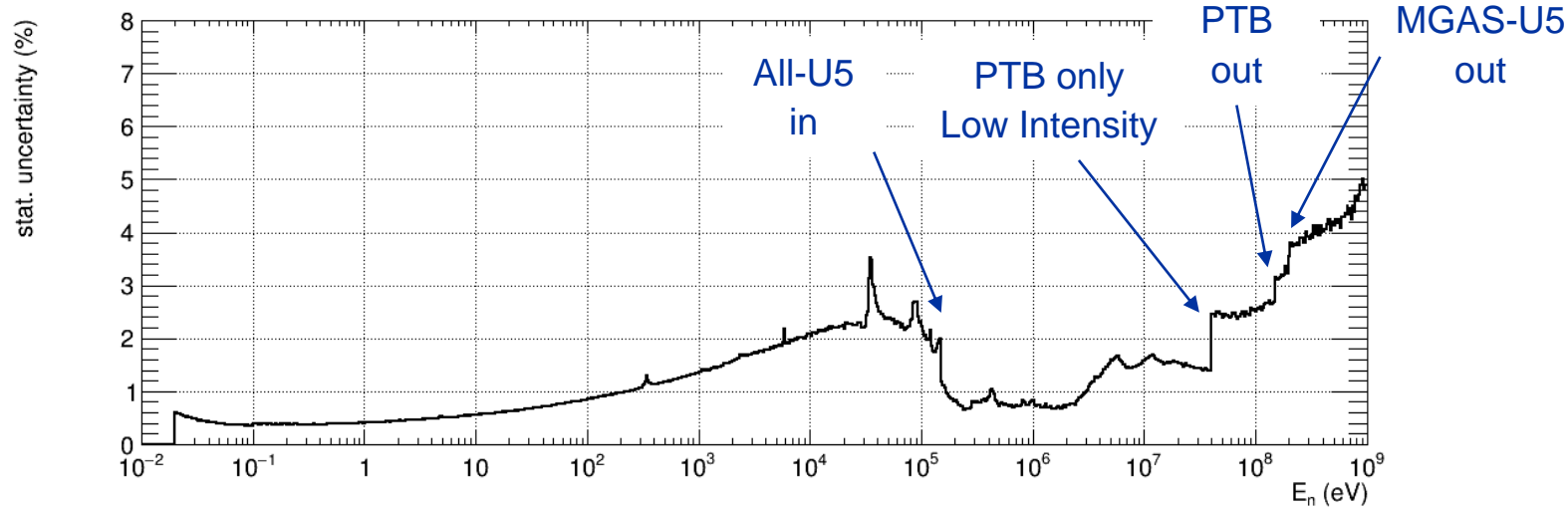
# Ratio to MGAS-U5 (scaled at 100-1000 eV)



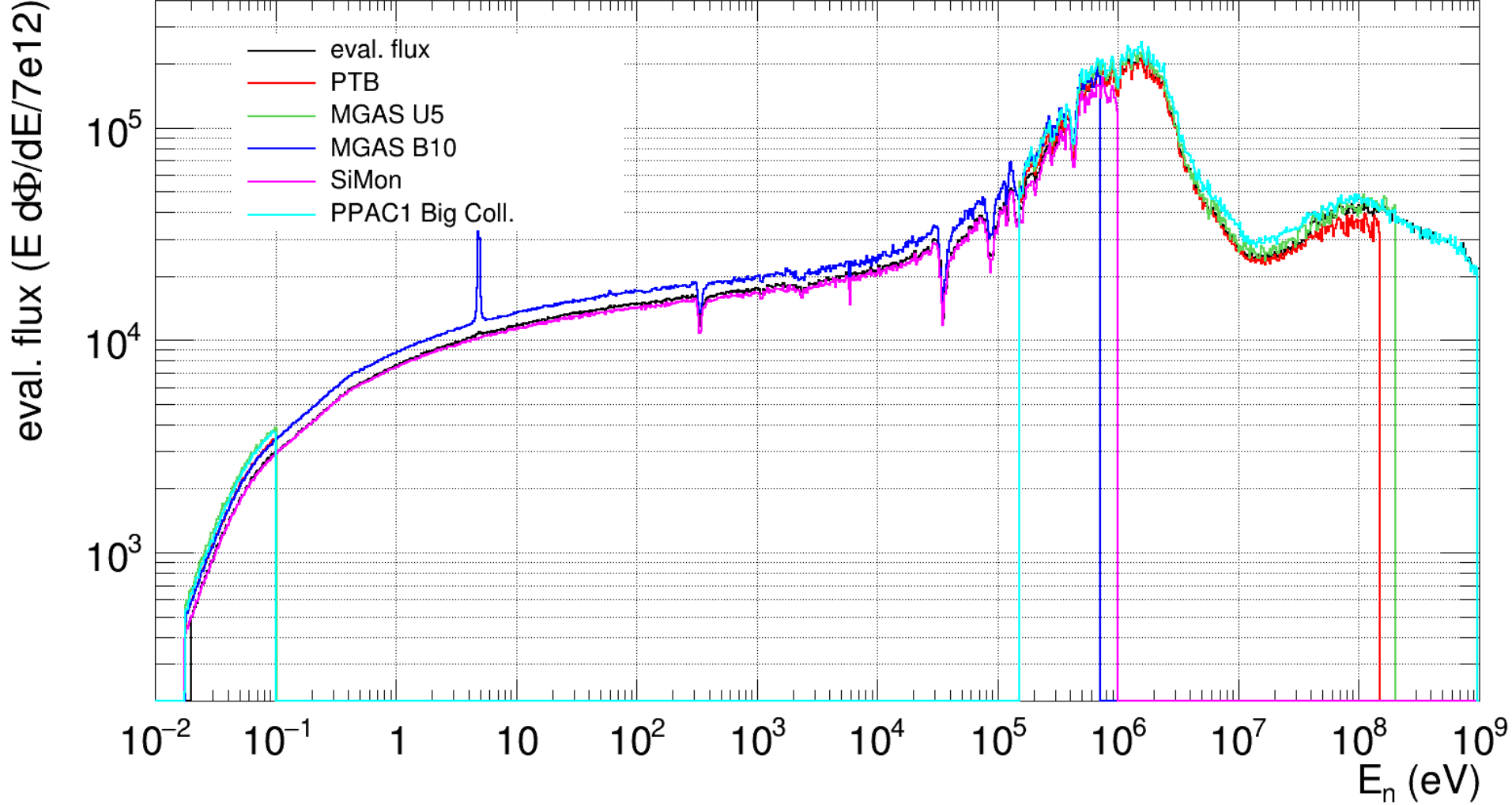
# Evaluated flux from absolute values of detectors



No PPAC1 small coll. considered (50 vs 100 bpd)

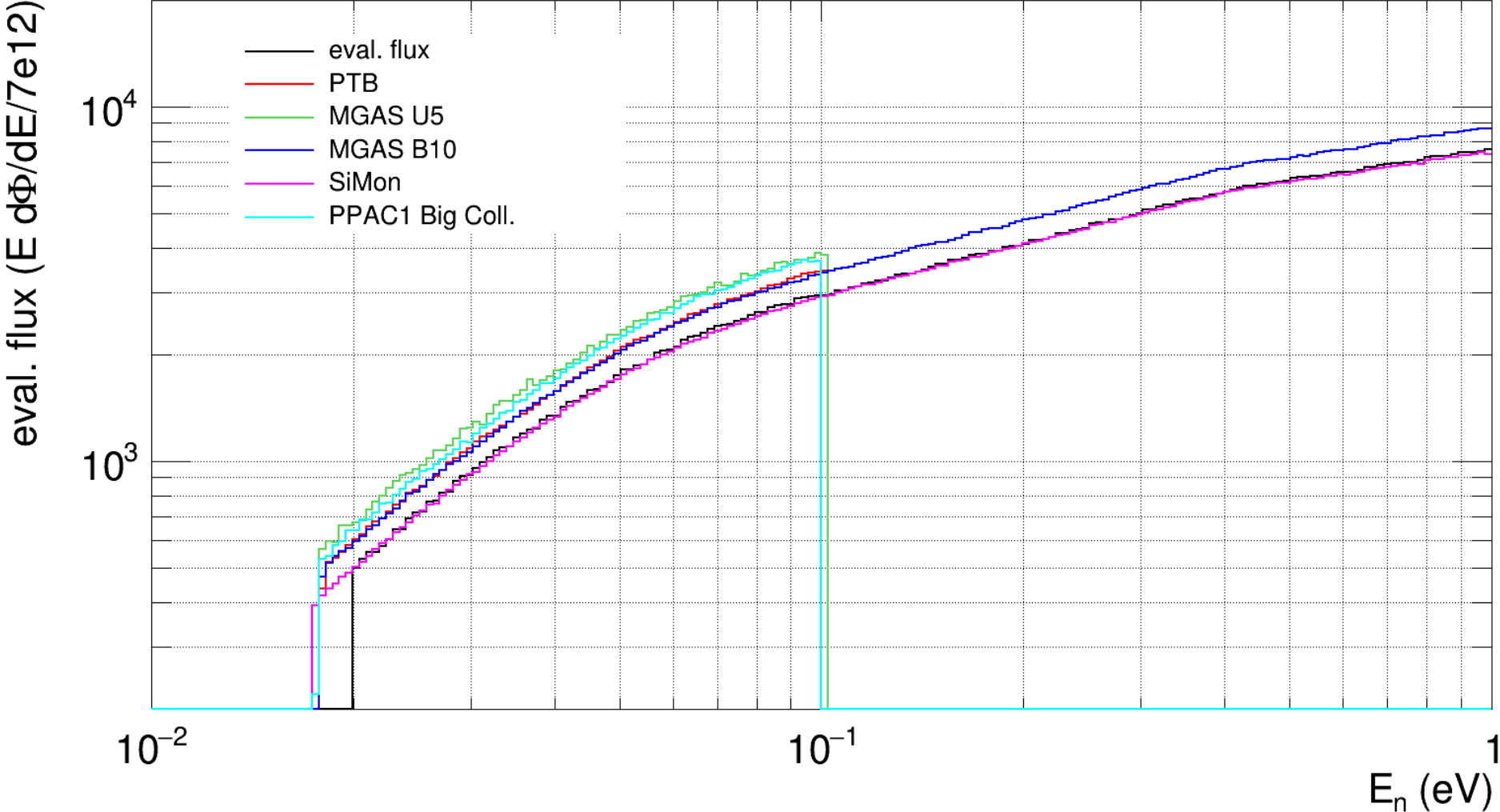


# Eval. Flux vs detectors

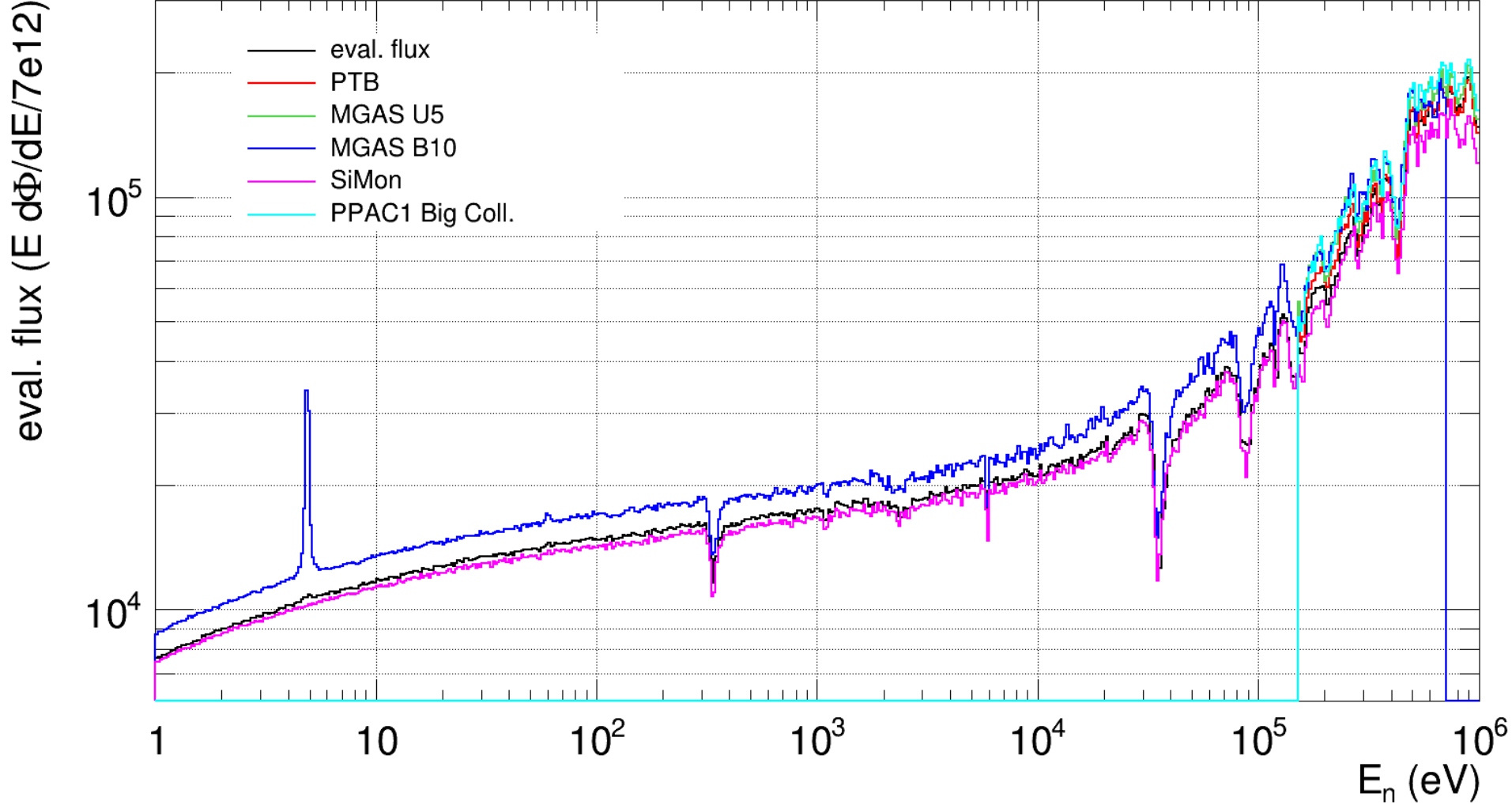




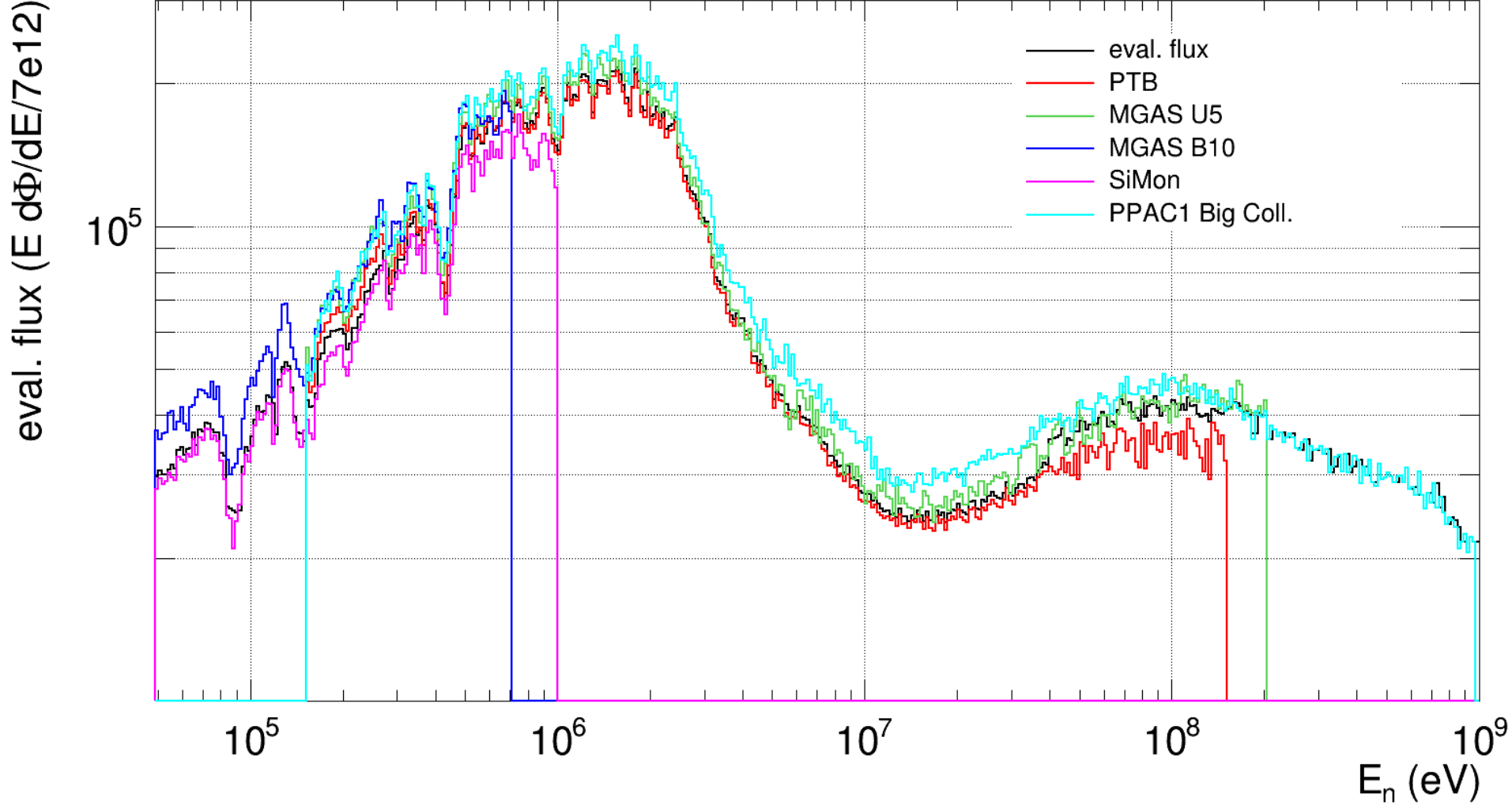
# Eval. Flux vs detectors (LE)



# Eval. Flux vs detectors (ME)

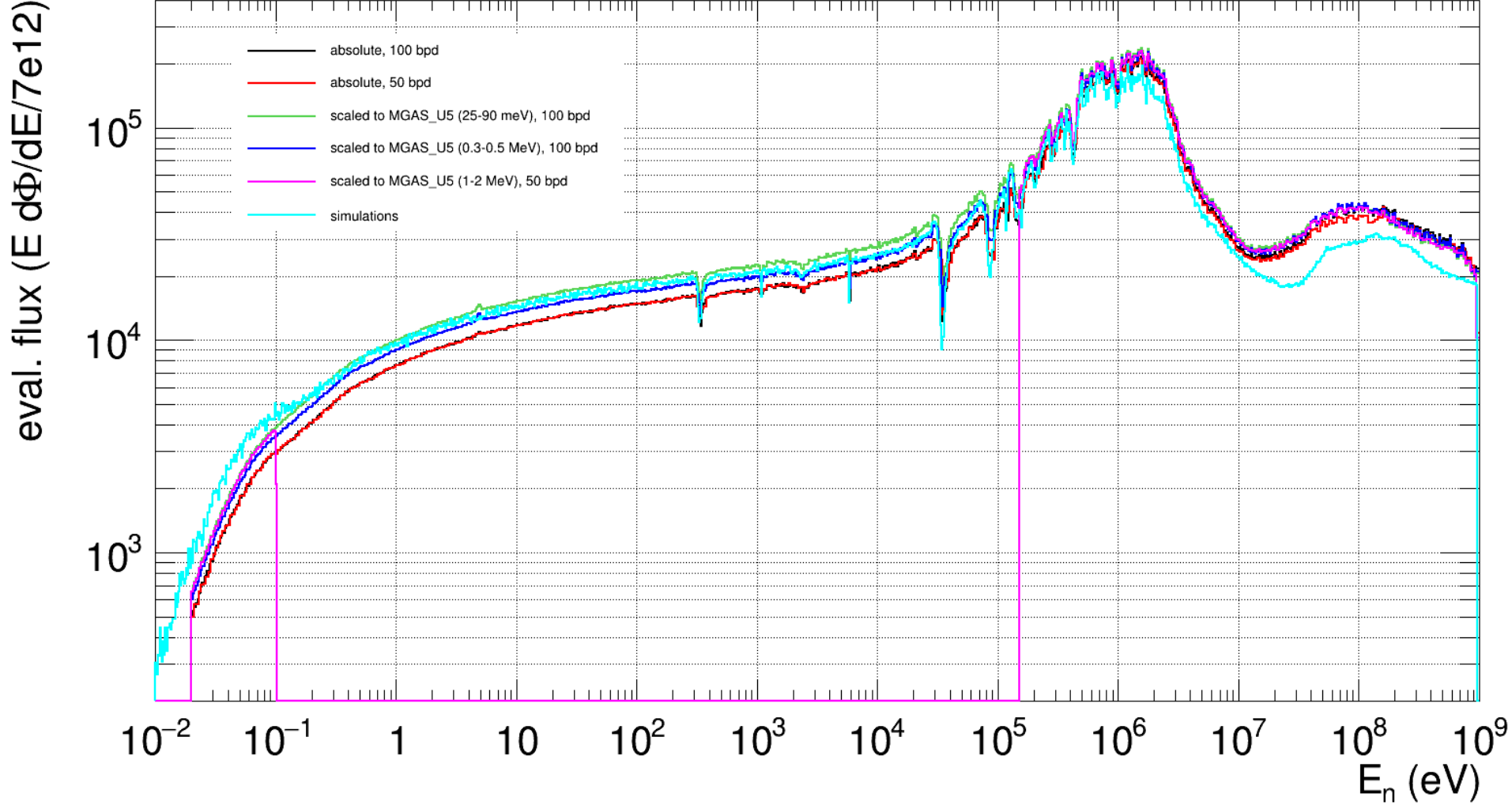


# Eval. Flux vs detectors (HE)

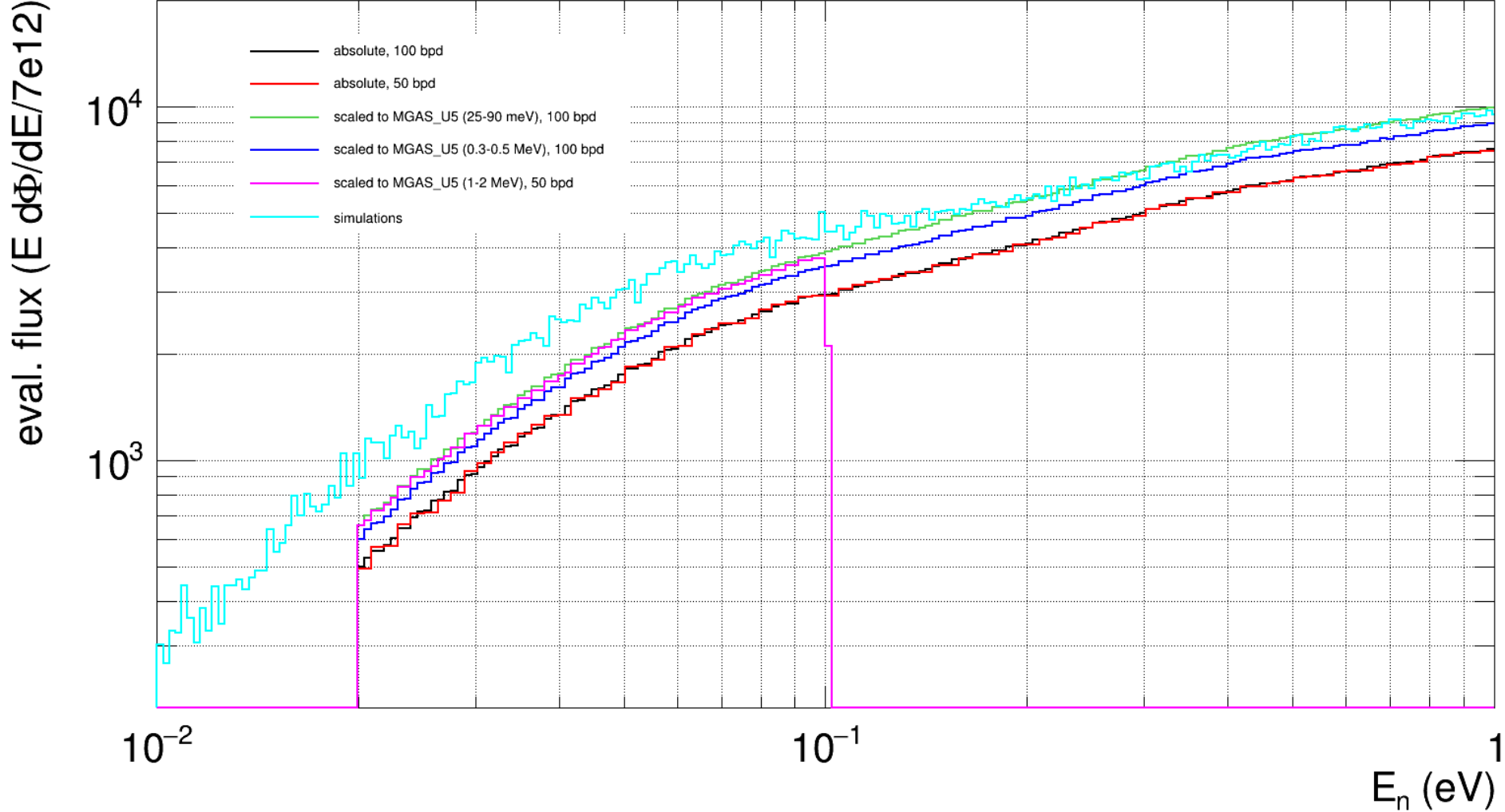


... repeated for all scaling ranges  
and plotted together ...

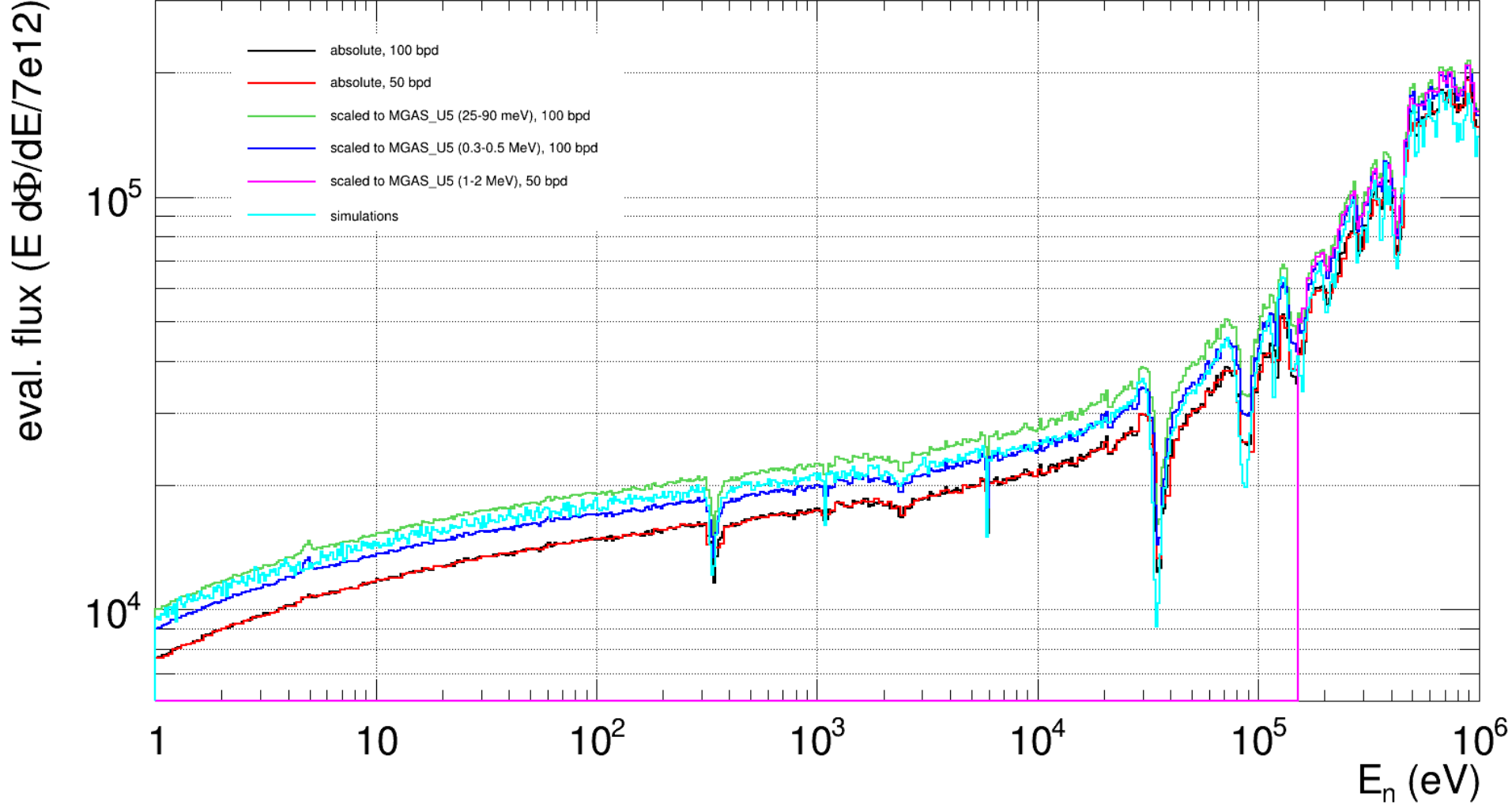
# Eval. Flux for abs/LE/ME/HE scaling



# Eval. Flux for abs/LE/ME/HE scaling (LE)



# Eval. Flux for abs/LE/ME/HE scaling (ME)



# Eval. Flux for abs/LE/ME/HE scaling (HE)

