Weekly Meeting

June 28 2018

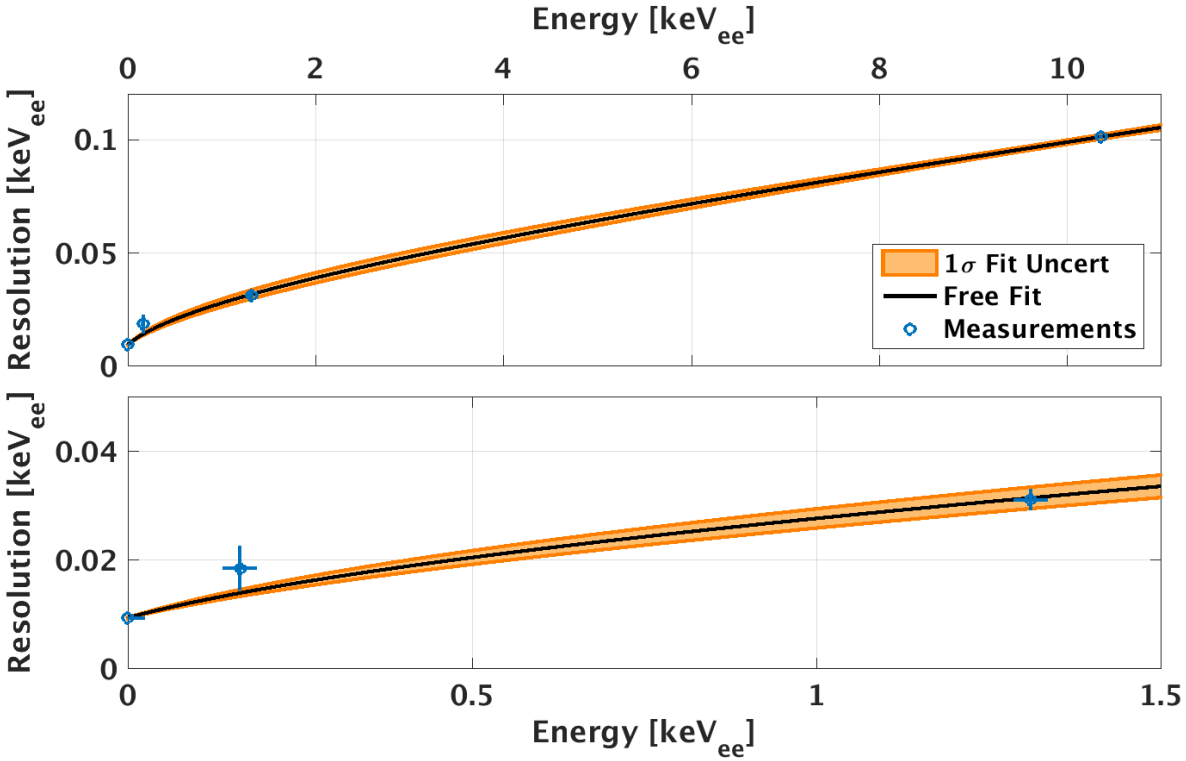
SNOLAB Projections – Some Hiccups

- Although I had some initial projections, I needed to adjust a few elements to make it aligned to SNOLAB
  - The σ_E of the signal (energy resolution) in the limit calculation
  - Adjusting the analysis thresholds

- I also spend some time cleaning up the code. Instead of my ad-hoc approach to dark photon search, made it a separate code to run, and made it so setup files know whether to set WIMP parameters or dark photon parameters (defining analysis thresholds, masses to search for, etc)
  - Initially this is where I thought my problems were coming from

Energy Resolution in Limit Code

- For CDMSLite R2:

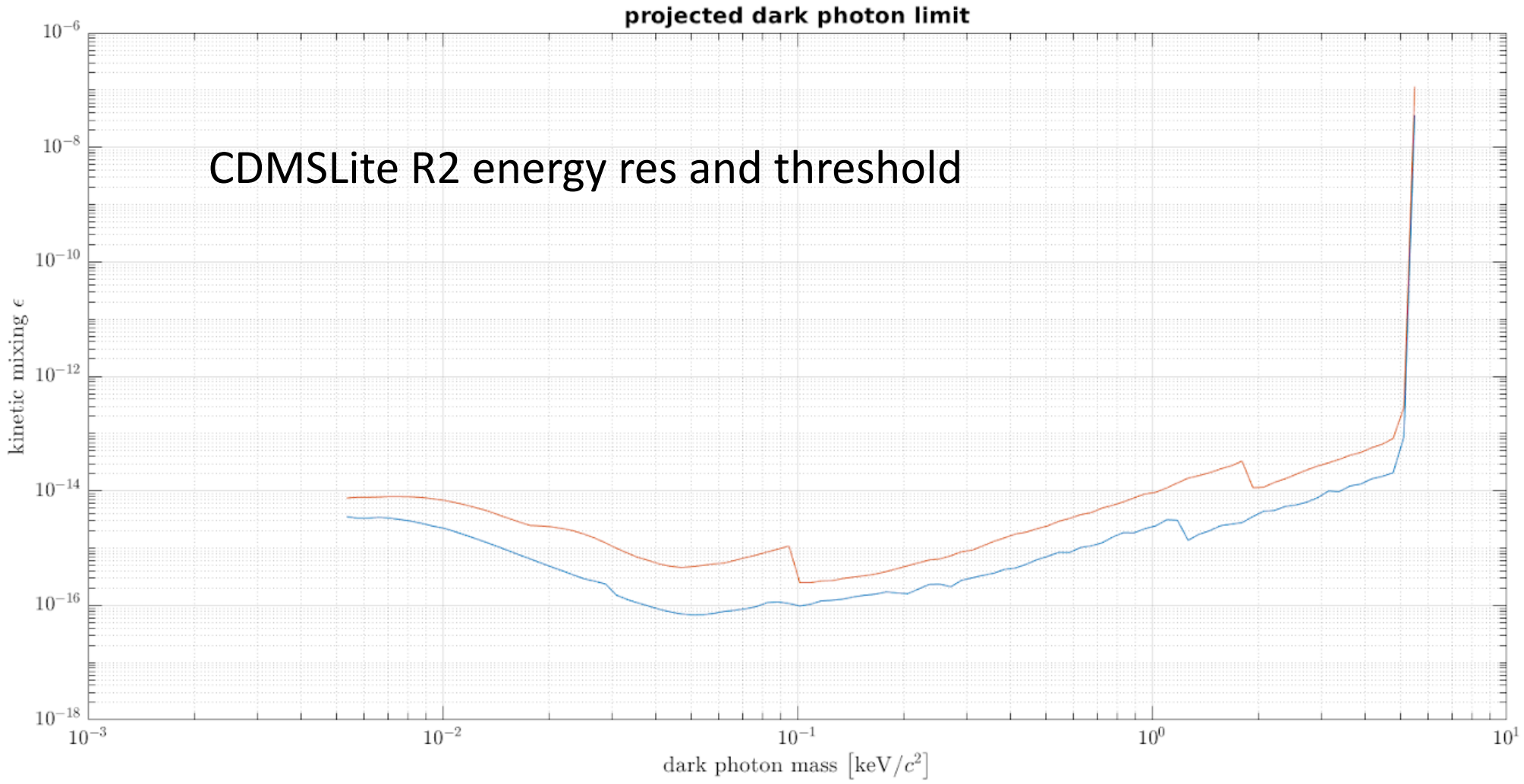


- For SNOLAB:
  - Using ‘Goal’ energy resolutions: 10 eV (7 eV) for Ge (Si)

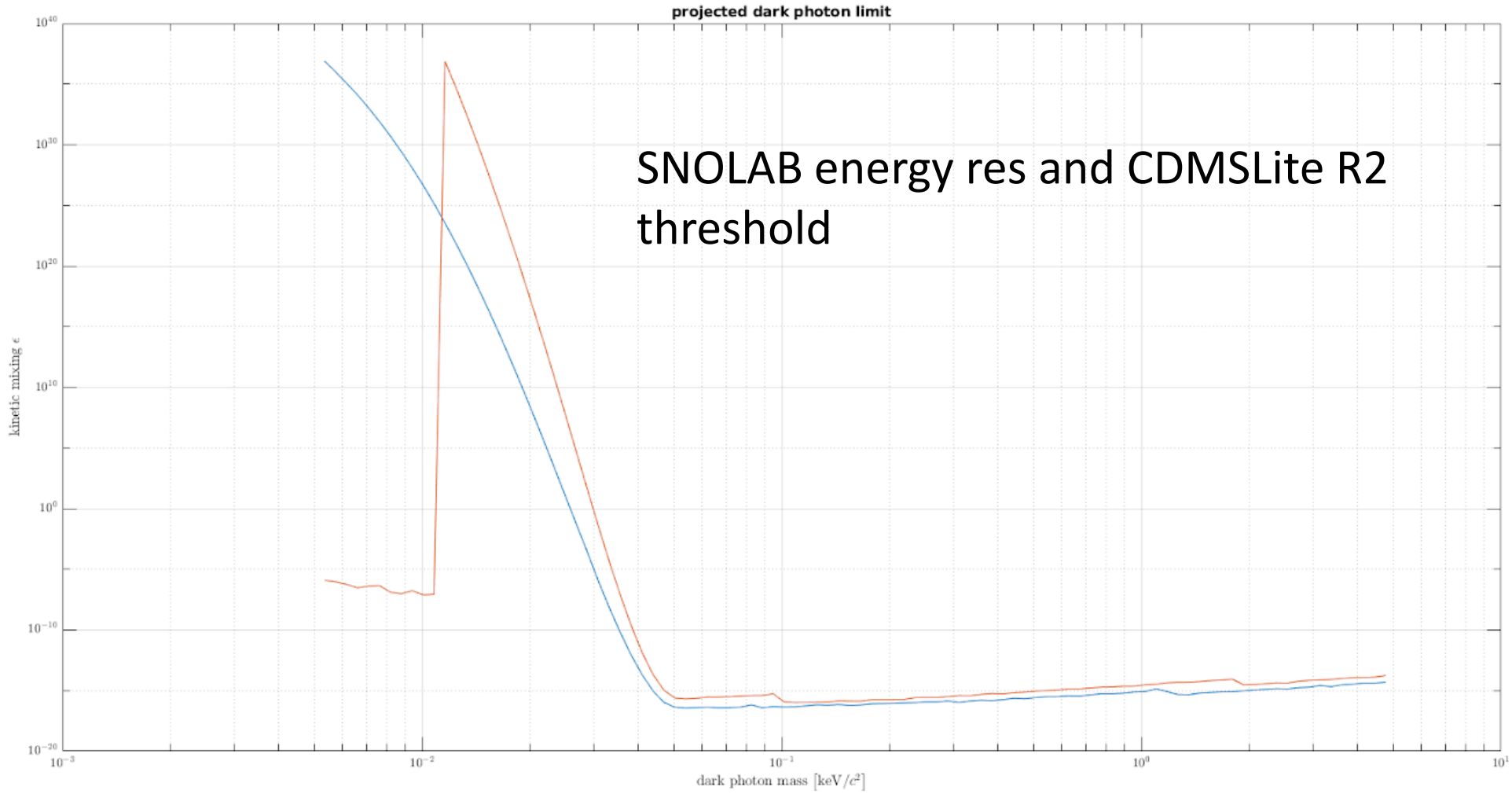
Analysis Threshold in Limit Code

- In CDMSLite R2:
  - Lower threshold set at 0.0551 keV
- For SNOLAB:
  - Lower thresholds set at thresholds experiment thresholds: 100 eV (Pt) for both Ge and Si
  - This corresponds to 2.9 eV in Ge and 3.67 eV in Si

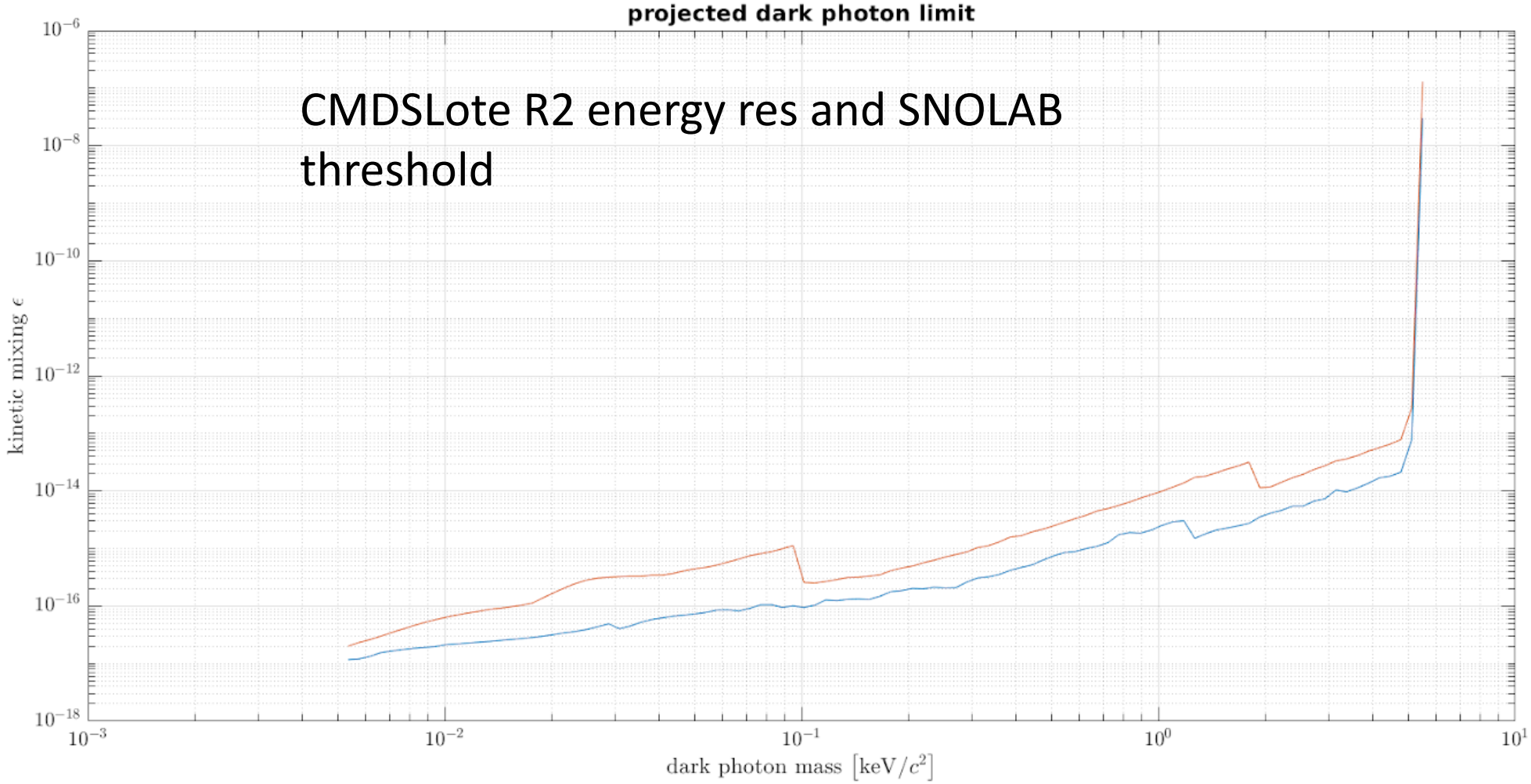
Comparing these limit projections



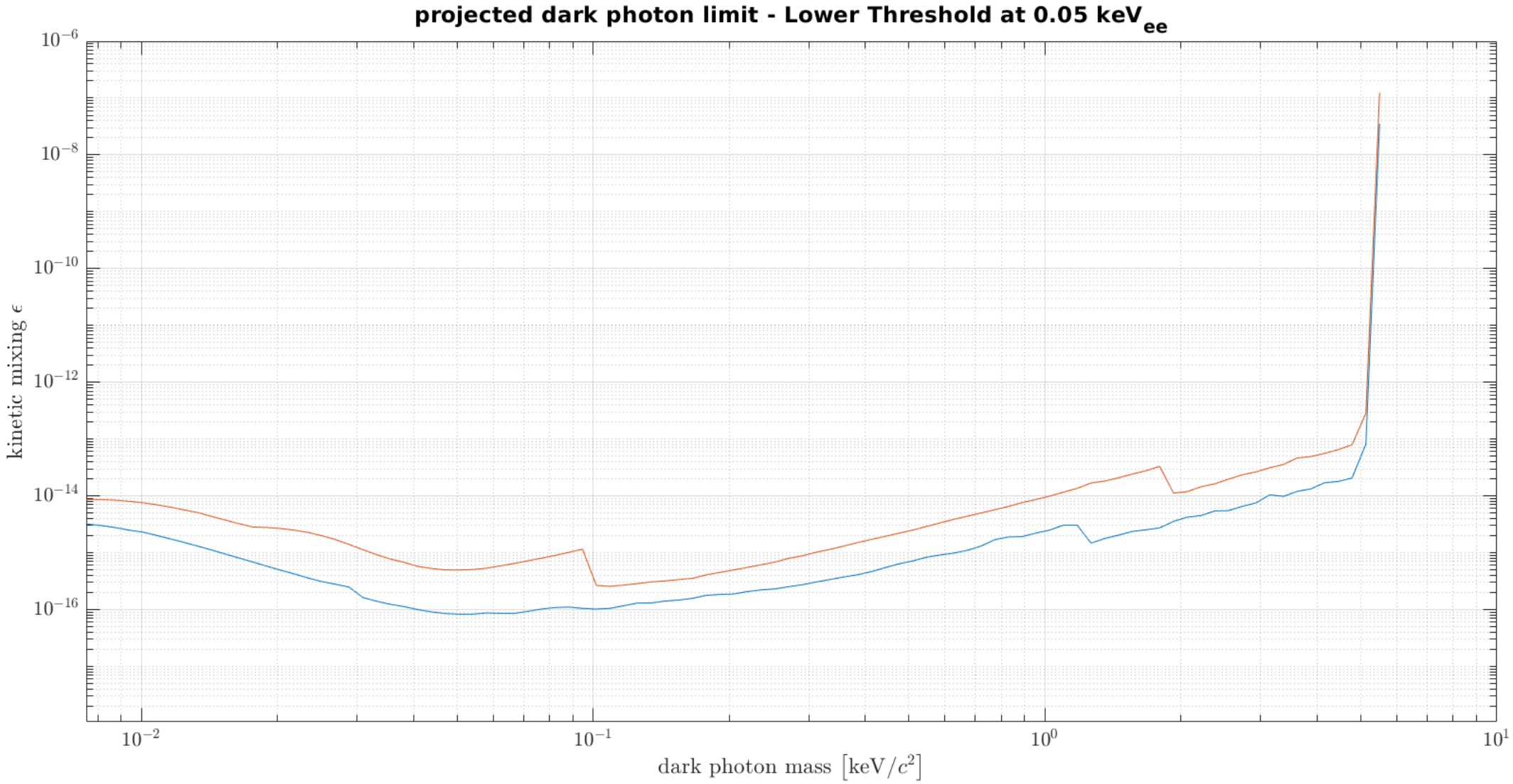
Comparing these limit projections



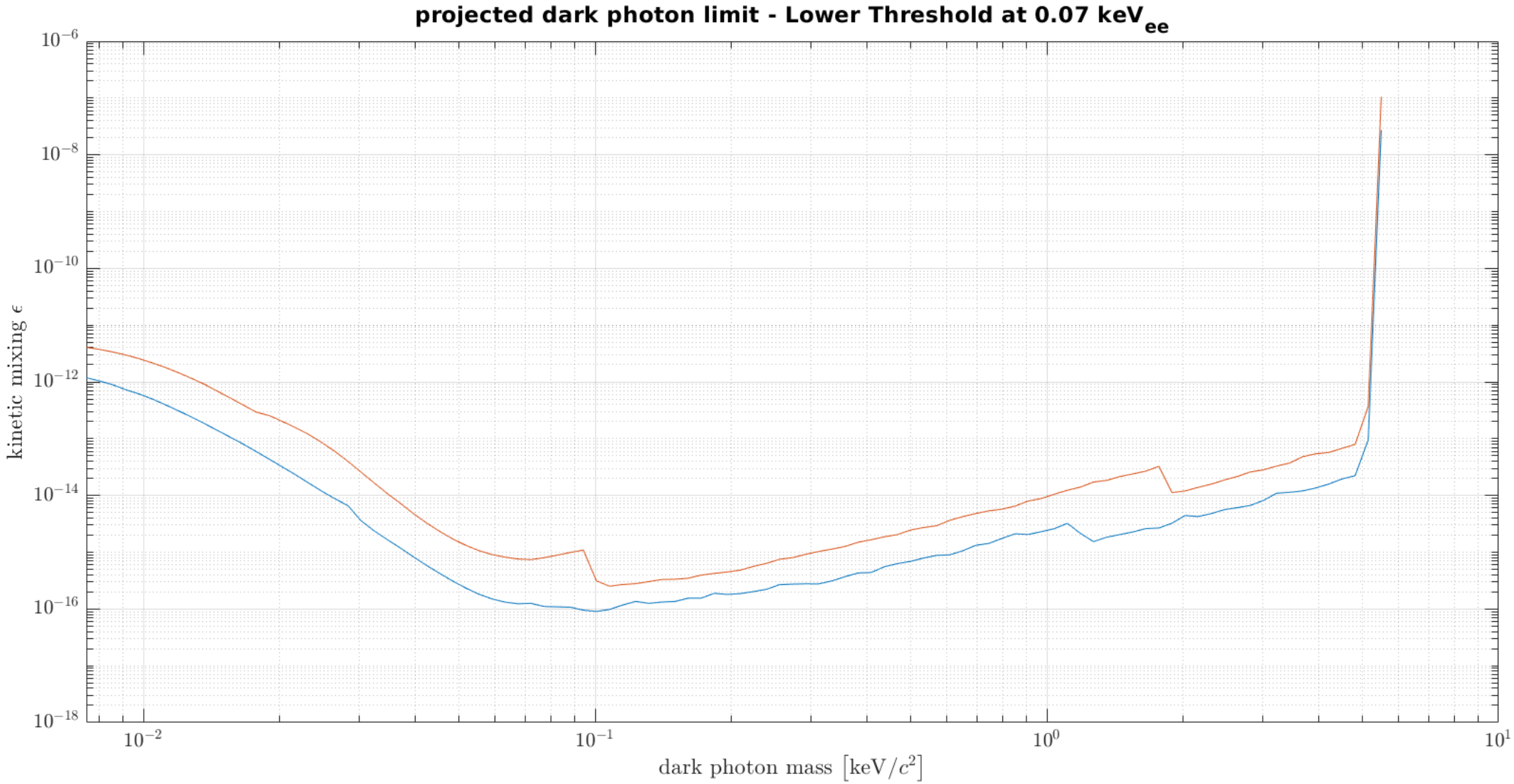
Comparing these limit projections



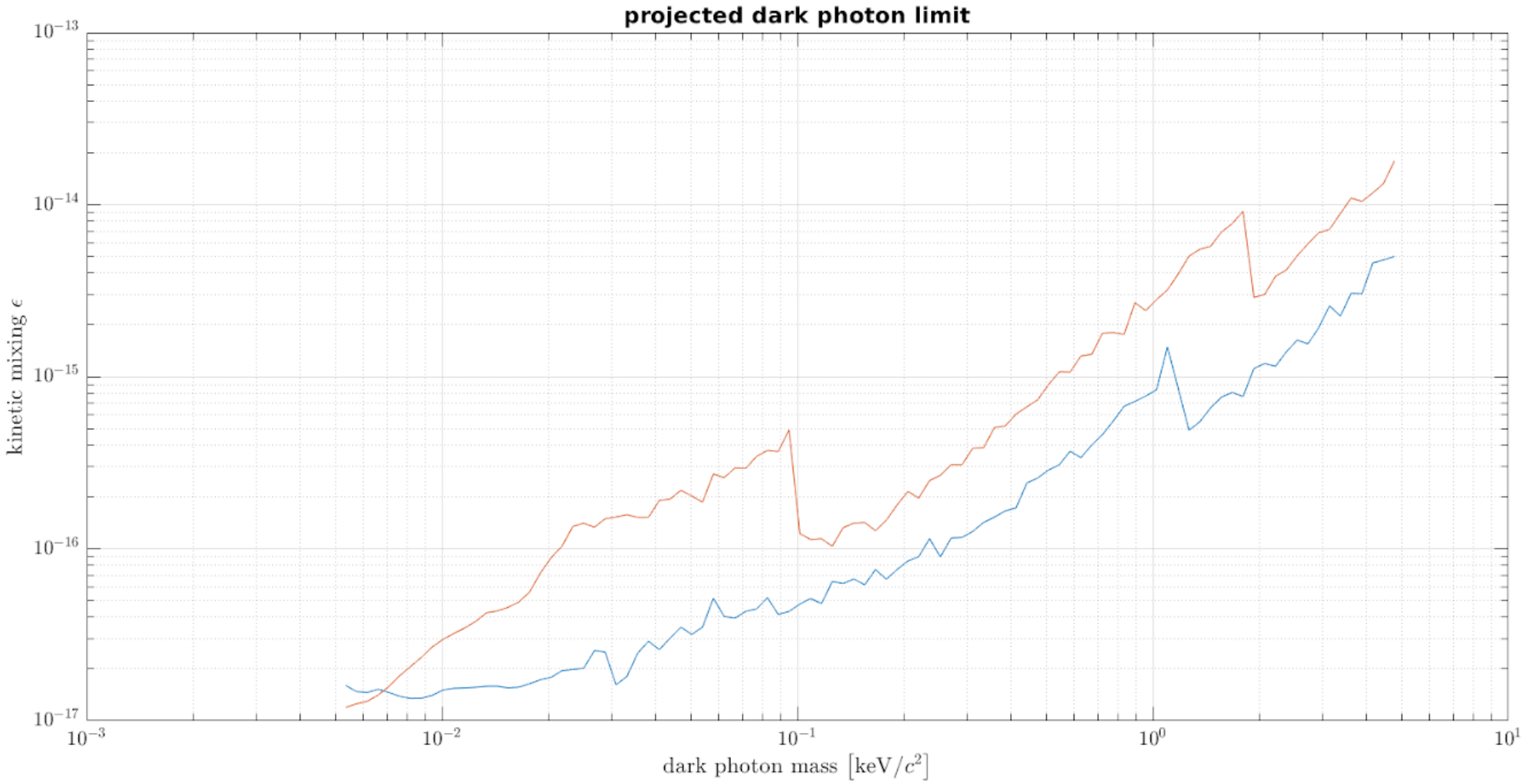
Comparing these limit projections from yesterday



Comparing these limit projections from yesterday



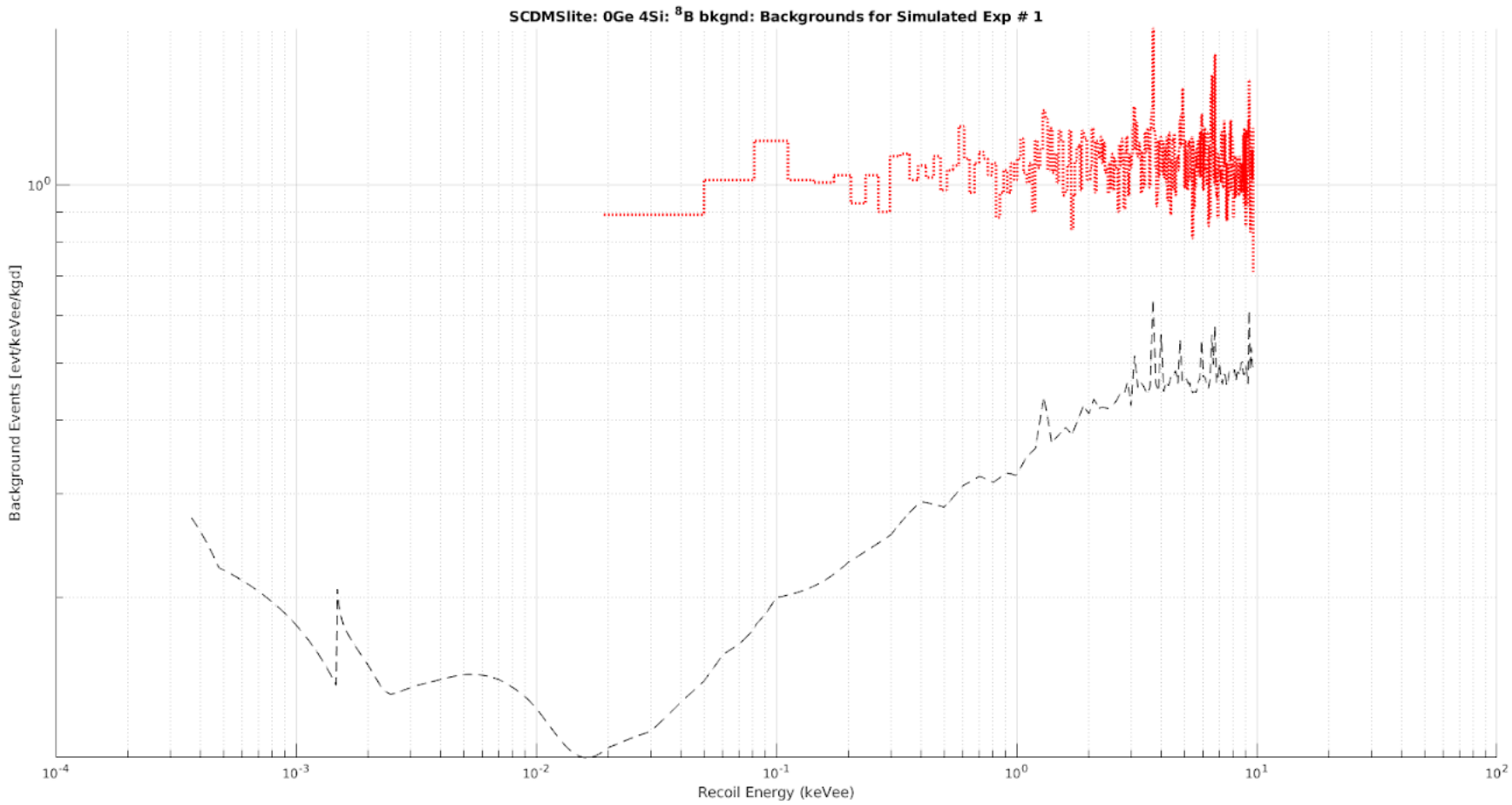
Comparing these limit projections from



Problems with converting from E_nr to E_ee

- I noticed this while trying to determine the thresholds
- The thresholds are 100 eV (Pt) for both Ge and Si
- Using $P_t = E_{ee}\left(1 + \frac{V}{\varepsilon}\right)$, we get 2.9 eV for Ge and 3.67 eV for Si
- However, the thresholds in E_{nr} are stated as 40 eV for Ge and 78 eV for Si.
- Using $E_{ee} = E_{nr}\frac{\left(1+\frac{VY(E_{nr})}{\varepsilon}\right)}{\left(1+\frac{V}{\varepsilon}\right)}$ to convert from E_{ee} to E_{nr}, I get the energy resolution to be 5.5 eV for Ge and 3.7 eV for Si

Looking at the background spectrums



Looking at the background spectrums

- I think the mismatch is coming from the fact that the “true” spectrum is only shifted in the x-axis, not adjusted in the y-axis, which is a rate/energy /kgd unit.
- The “data” plot is adjusted in both the x-axis and the y-axis.

- Looked at regular histograms

Looking at the background spectrums