

Deciding GRBs to Analyze

- We apply a weighting function to GRB candidates to determine which candidates have better chance of giving us good results.
- Keys to weighting function: Time delay between GRB and start of observing, energy threshold of observation (based on angle of telescope), redshift of the event.
- Weighting function:

$$W = e^{-\tau(z, E_{th}(\theta))} / t_{obs}$$

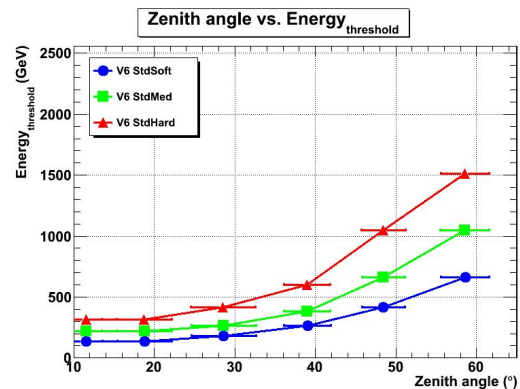
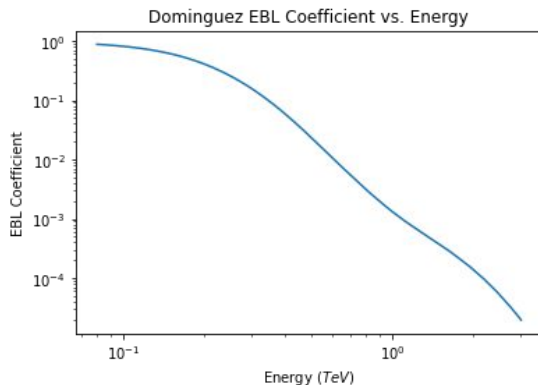
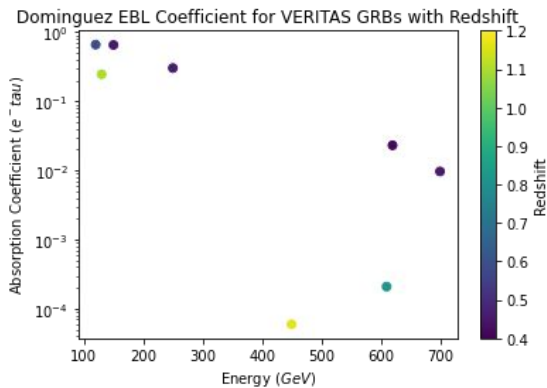
τ – EBL optical depth

θ – zenith angle of observation

t_{obs} – observing time delay

Weighting Function: EBL Absorption

- Tau-factor in the weighting function is the EBL Absorption coefficient, which is a function of redshift and energy threshold.
- Several models for this, 3 of which (Finke, Dominguez, Franceschini) are usable directly from gammapy. We used Dominguez model here.
- Used gammapy to calculate this value, and then the weight, by dividing the EBL coefficient by the delay time, for all the candidate GRBs.
- Energy threshold for VERITAS GRBs calculated from VERITAS Performance Page



Weighting Function: Results

- Also calculated the weight value for the Tevcat GRBs-- baseline comparison to see what weight values *could* give high-quality results like the Tevcat GRBs.
- Results:

VERITAS GRBs

GRB	Weight
150120A	8.17E-04
150323A	2.36E-03
150423A	7.86E-03
160509A	3.01E-08
170428A	6.63E-06
170519A	1.80E-06
190114C	1.01E-06
201216C	2.77E-05

Tevcat GRBs

GRB	Weight
190114C	4.10E-03
180720B	1.98E-05
190829A	5.97E-05
201216C	5.94E-05

Results show us that we have a good amount of GRBs with a solid chance of giving us interesting results-- their weights are not super low!

Next Steps: Back to VEGAS for Analysis

- We decided to analyze the following GRBs: 201216C, 170519A, 170428A, 160509A, 150423A, and 150120A.
- Need to get information on the runs for these sources-- which runs were clean, which need time cuts due to issues during run (hardware, weather problems), which runs need to be removed entirely, telescope missing info
- VERITAS Loggen has this information
- Compile runlists, time cut info, extra info for VEGAS
- And then start the analysis!
- Already started on GRB201216C
- The rest this week