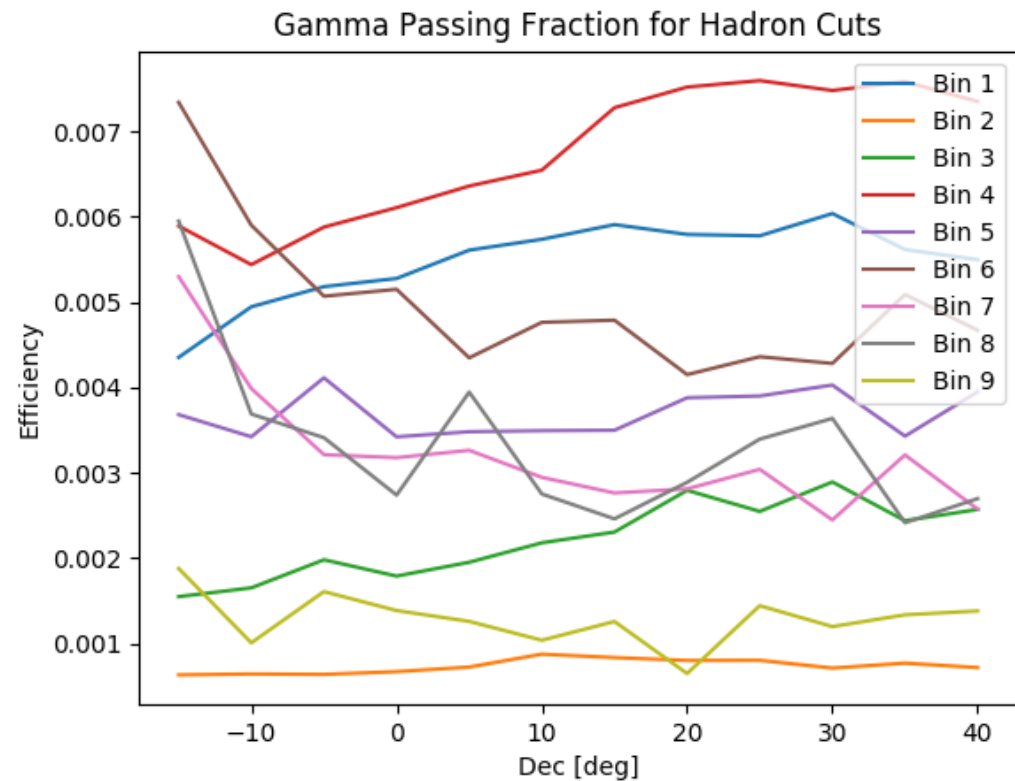


Signal Contamination of Alpha BKG (2)

Joe Lundeen
5/15/2020

Refresher

- Checking how high-extended signals can contaminate alpha background
- Need to correct for this when interpreting DM limits
 - Galactic halo inherently introduces extra background in “off” regions
- Looking at both gamma and hadron maps
- Effect in hadron maps is most likely negligible due to very low gamma passing rate
- Now checking effects from gamma maps

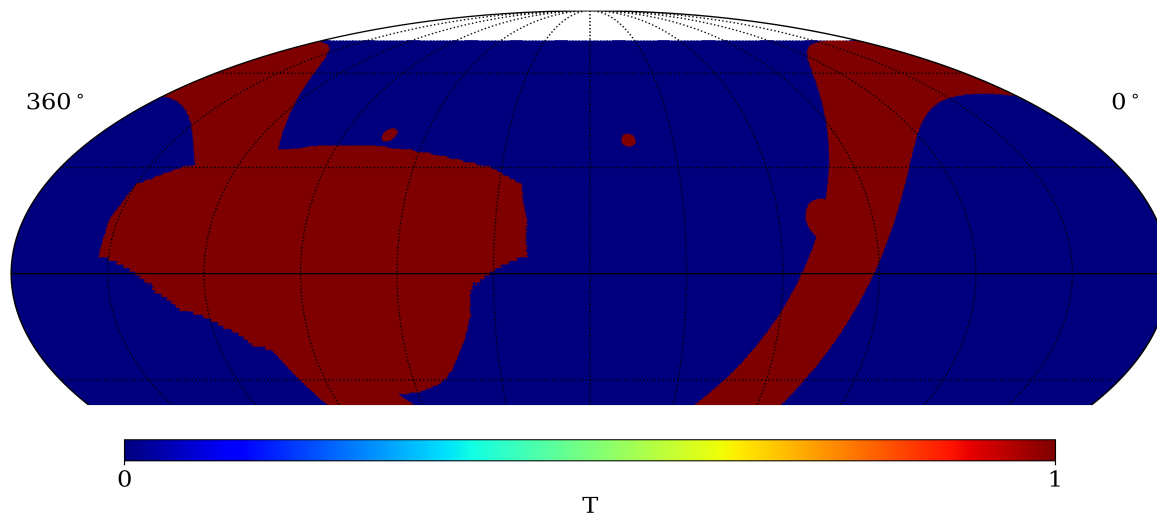


Method

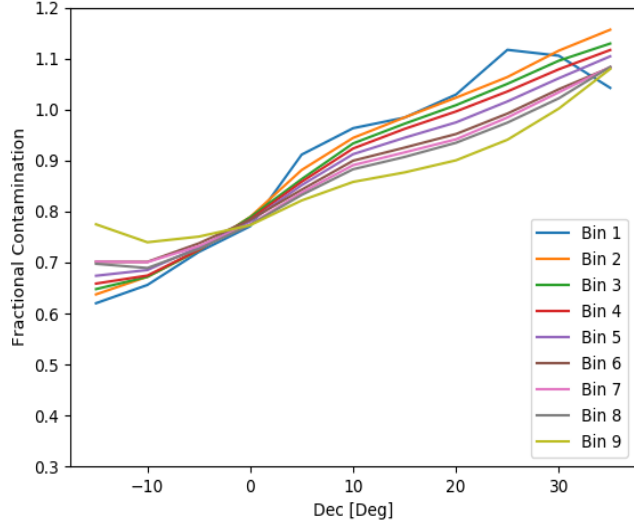
- Try injecting a simulated halo into the gamma maps
- Burkert profile, bb, 100 TeV mass
- Then recomputed alpha background with these new maps
- Checked how much extra background is introduced vs additional signal
- Define “contamination:
deltaBKG/signal per pixel

The ROI Returns

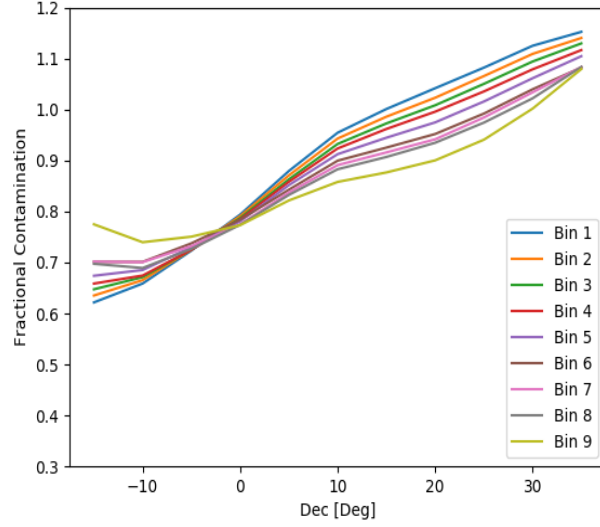
- Adding an ROI mask over most sensitive region reduces signal contamination of background in DI
- May also help for alpha factor
 - Pooja already uses the standard Galactic Plane mask, plus Crab, fermi bubble etc.
- Tried adding a larger mask based on the DM sensitivity studies
 - Smaller than previous Galactic ROIs
 - Necessary for alpha algorithms to converge



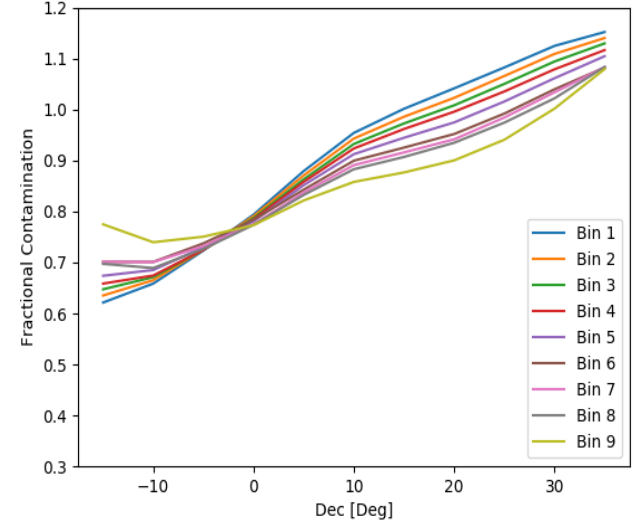
Fractional Contamination $\sigma\nu=1e-24$



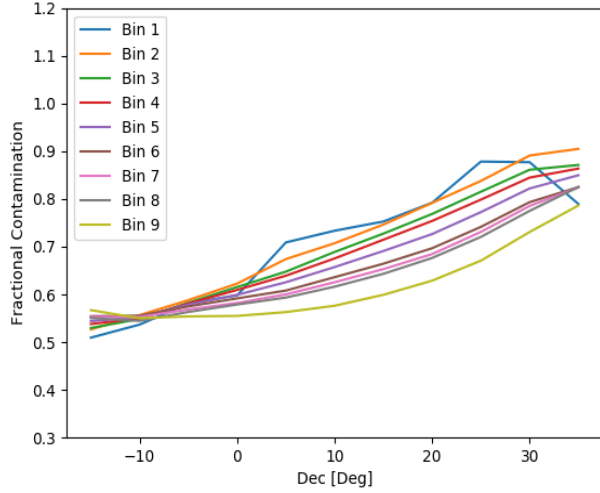
Fractional Contamination $\sigma\nu=1e-23$



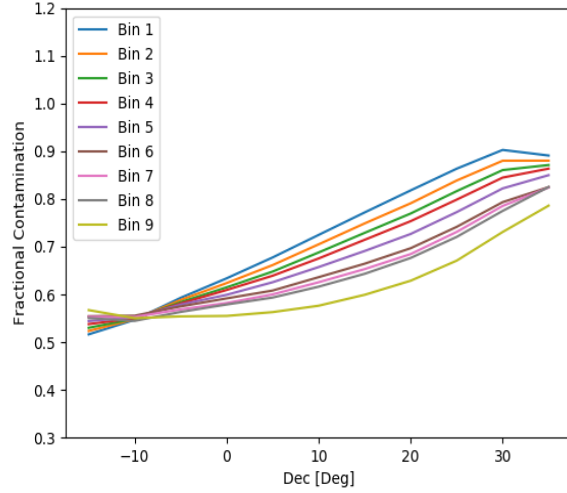
Fractional Contamination $\sigma\nu=1e-22$



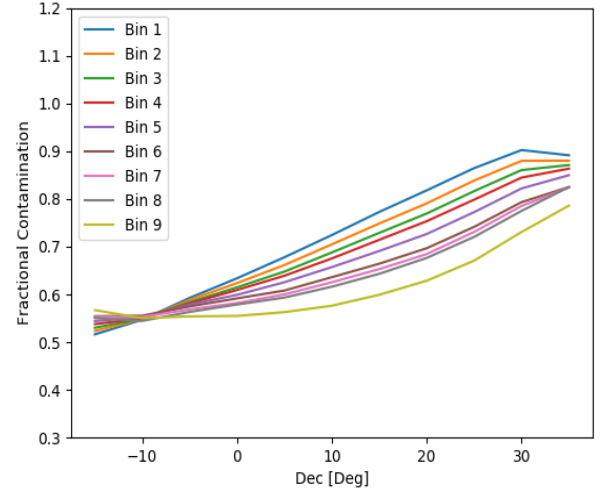
Fractional Contamination With ROI Mask $\sigma\nu=1e-24$



Fractional Contamination With ROI Mask $\sigma\nu=1e-23$



Fractional Contamination With ROI Mask $\sigma\nu=1e-22$



Discussion

- Good news: rate of contamination is roughly independent of flux
- OK news: it is bin-dependent
- Bad news: it's quite large, especially for $\text{decs} > 20$ deg
- Next things to check
 - Dependence on mass/channel
 - Spatial profile (will probably be better for NFW/Einasto)
 - Can the ROI be sized up?