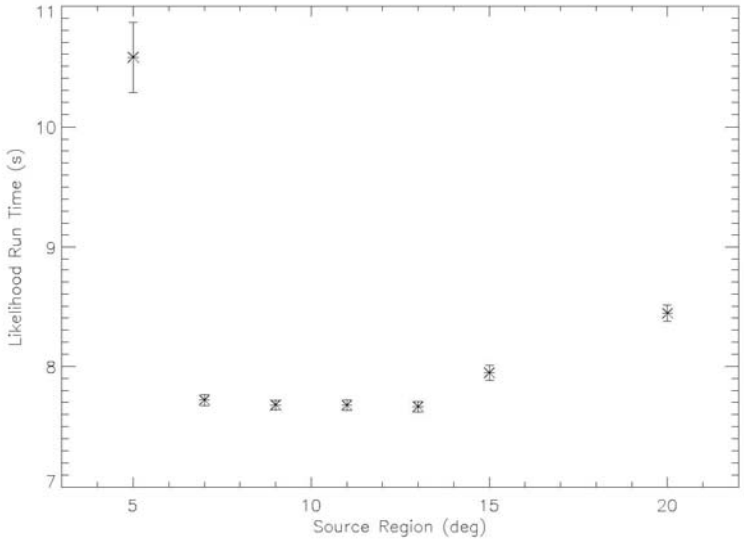
Region of Interest Study

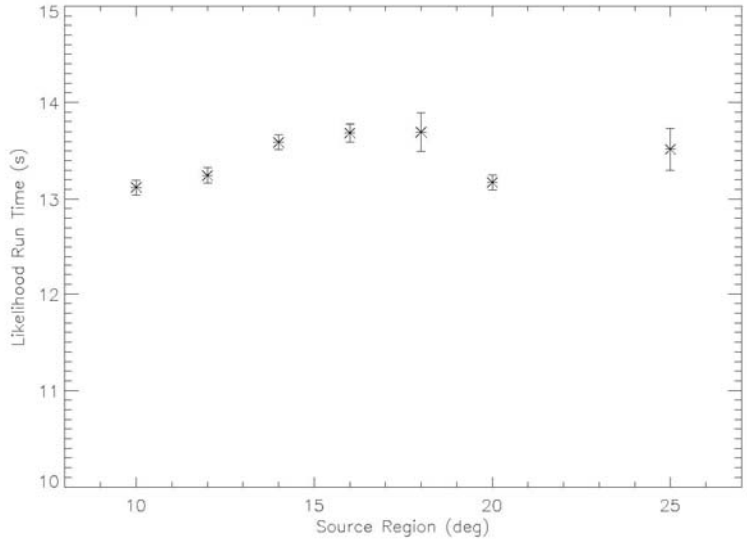
- Simulated 1 point source + extragalactic diffuse
- E_{min} = 100 MeV
- 3 ROI sizes: 5°, 10°, 20°
- Questions:
  - How does likelihood run time change with ROI size?
  - What is the smallest ROI/source region combination to yield accurate results?

Likelihood execution times

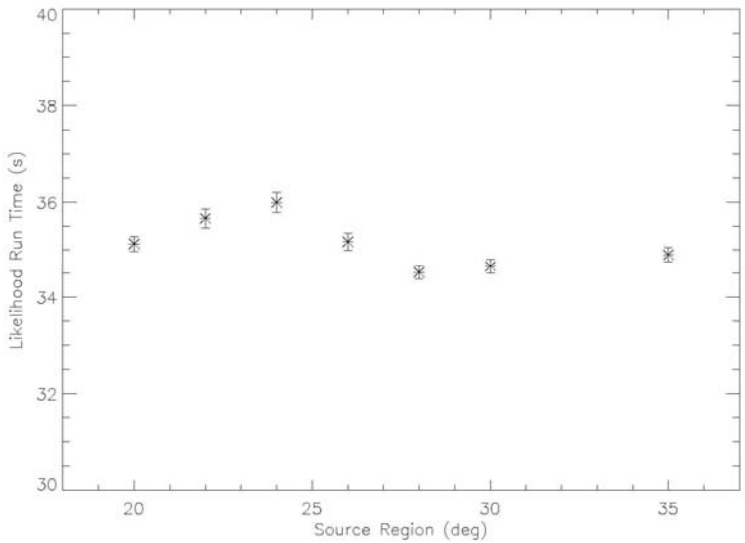
ROI = 5°, run time ≈ 8 s



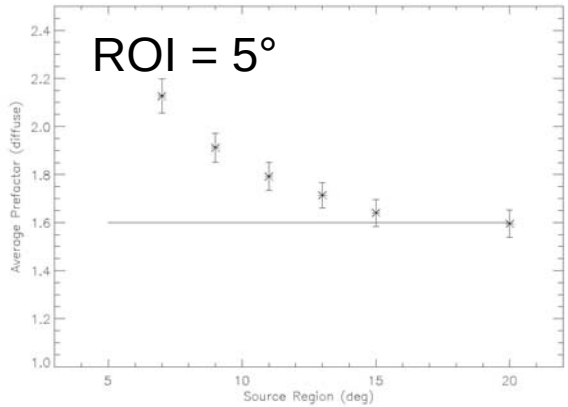
ROI = 10°, run time ≈ 13 s

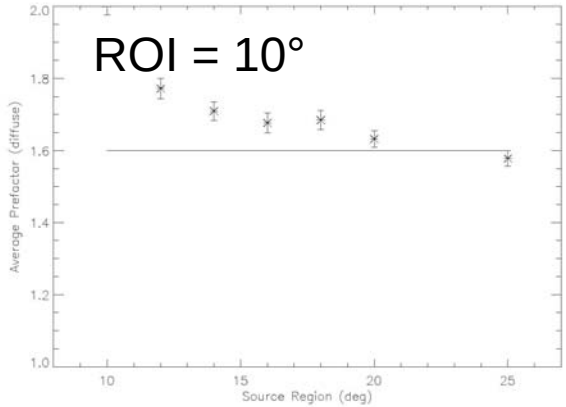


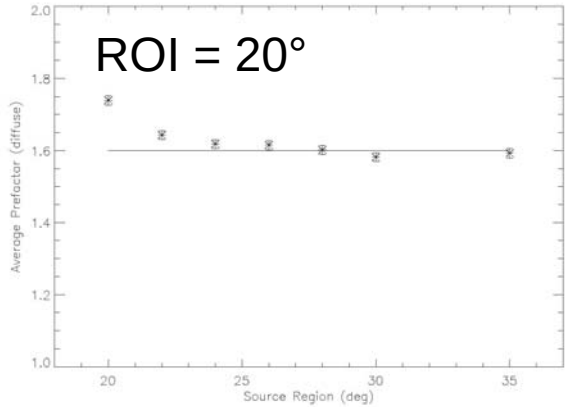
ROI = 20°, run time ≈ 35 s



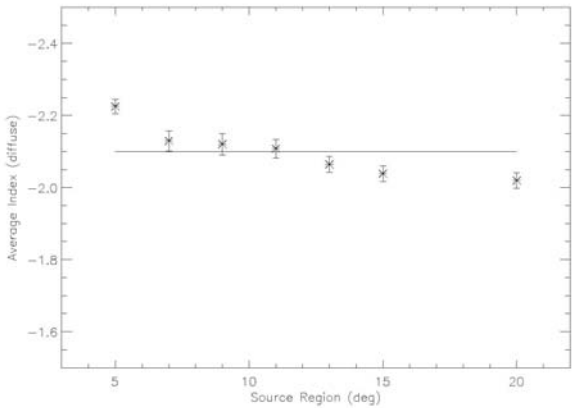
Diffuse Emission Parameters

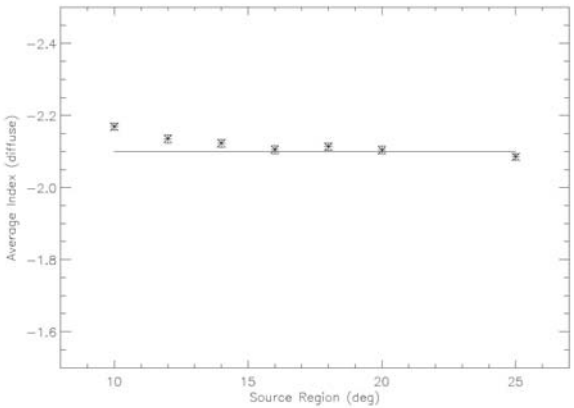


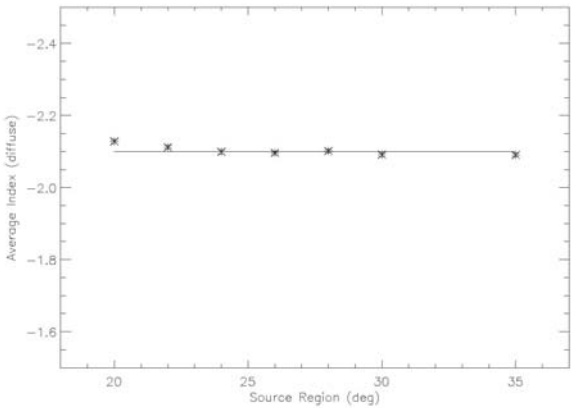




Prefactor







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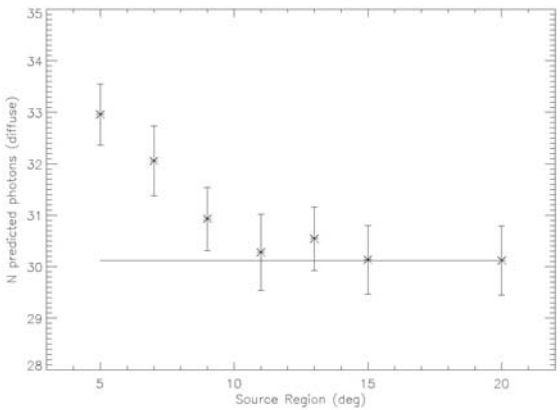
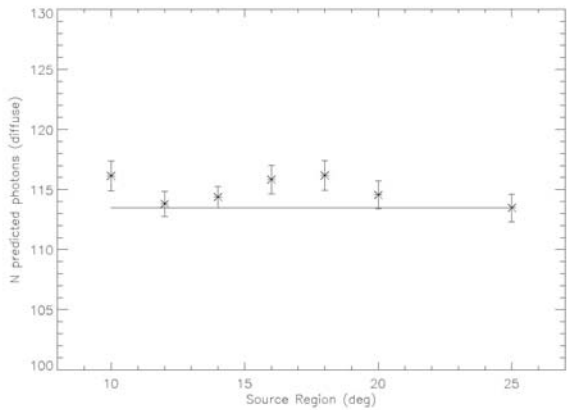
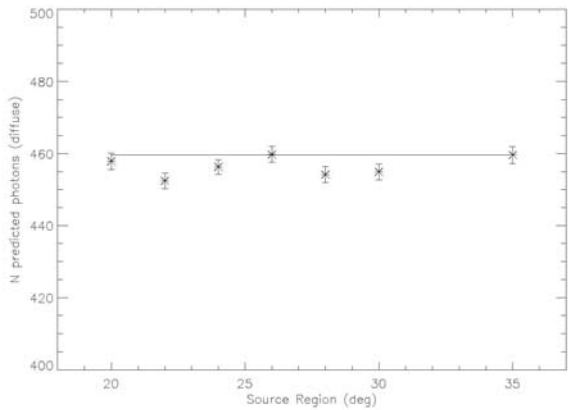
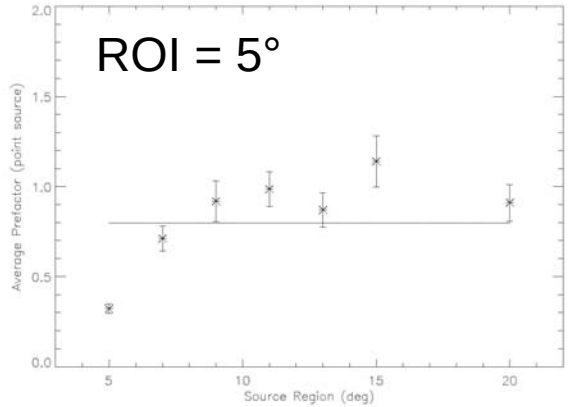


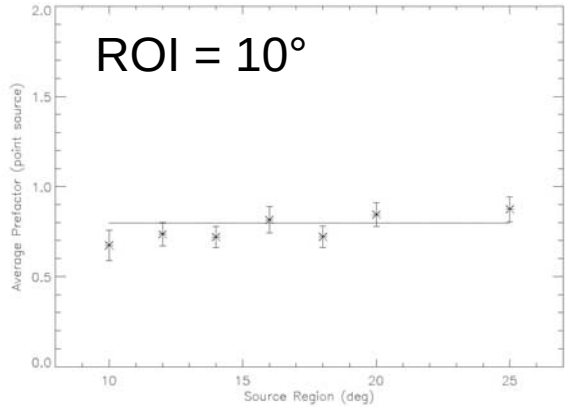


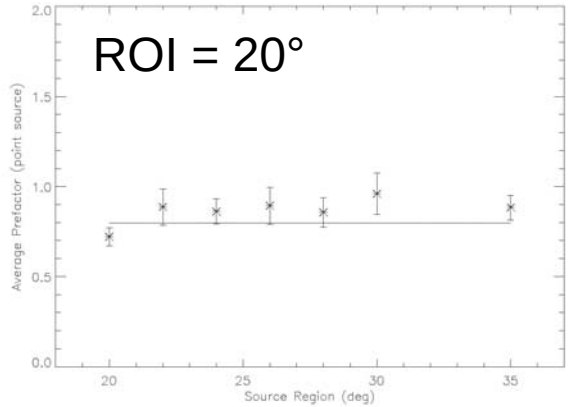


N_{pred}

Point Source Parameters







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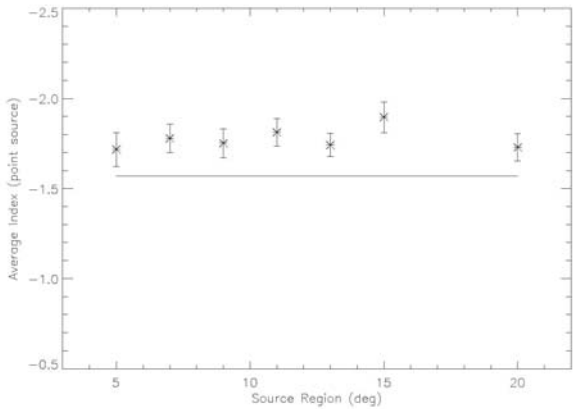

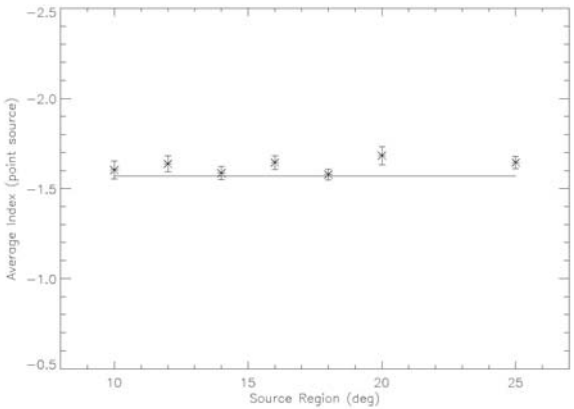

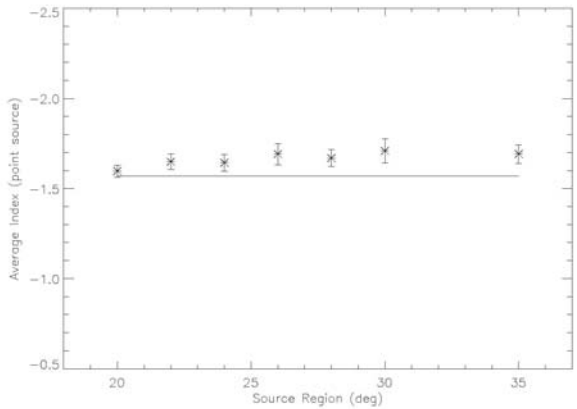

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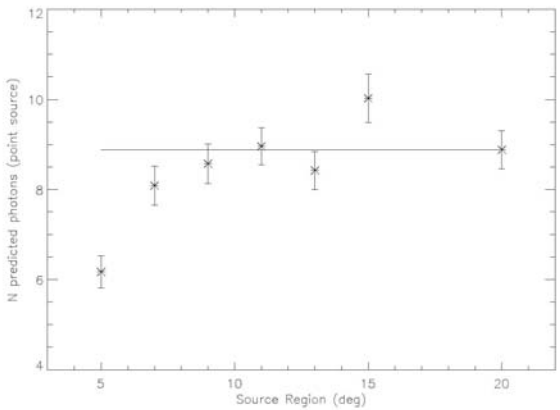

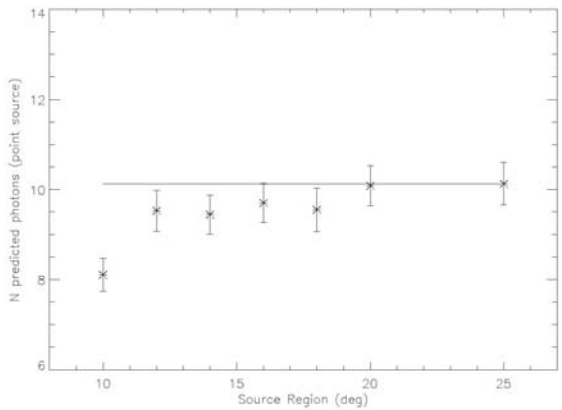

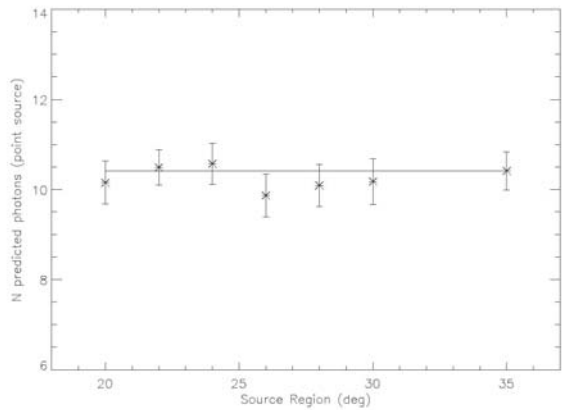

N_{pred}

Conclusions

- Source region = ROI + 10° is safe
- ROI = 5° is too small to recover spectral index
- ROI = 10°, source region = 20°
  recovers all parameters accurately
- Likelihood analysis with ROI = 10° is ~3×
  faster than with ROI = 20°