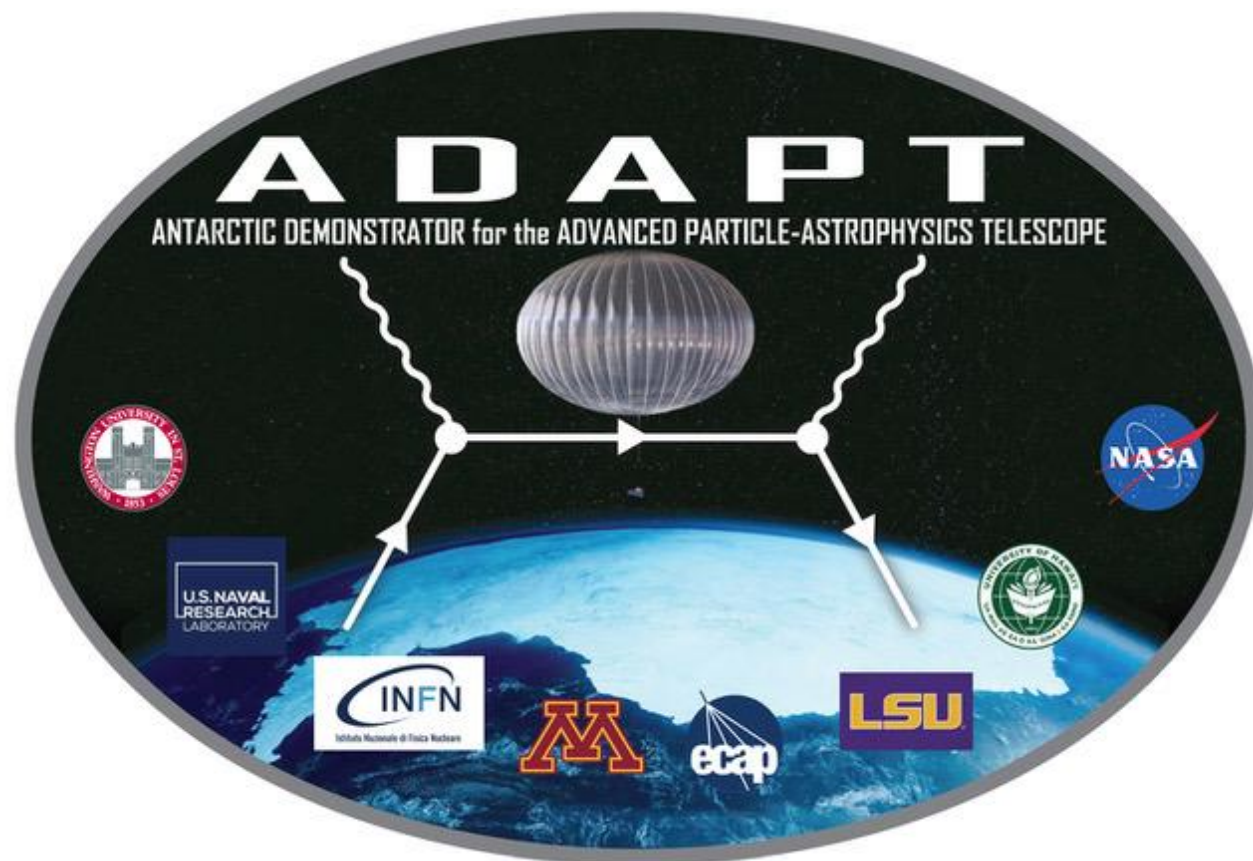


The Advanced Particle-astrophysics Telescope: Simulation of the Instrument Performance for Gamma-Ray Detection

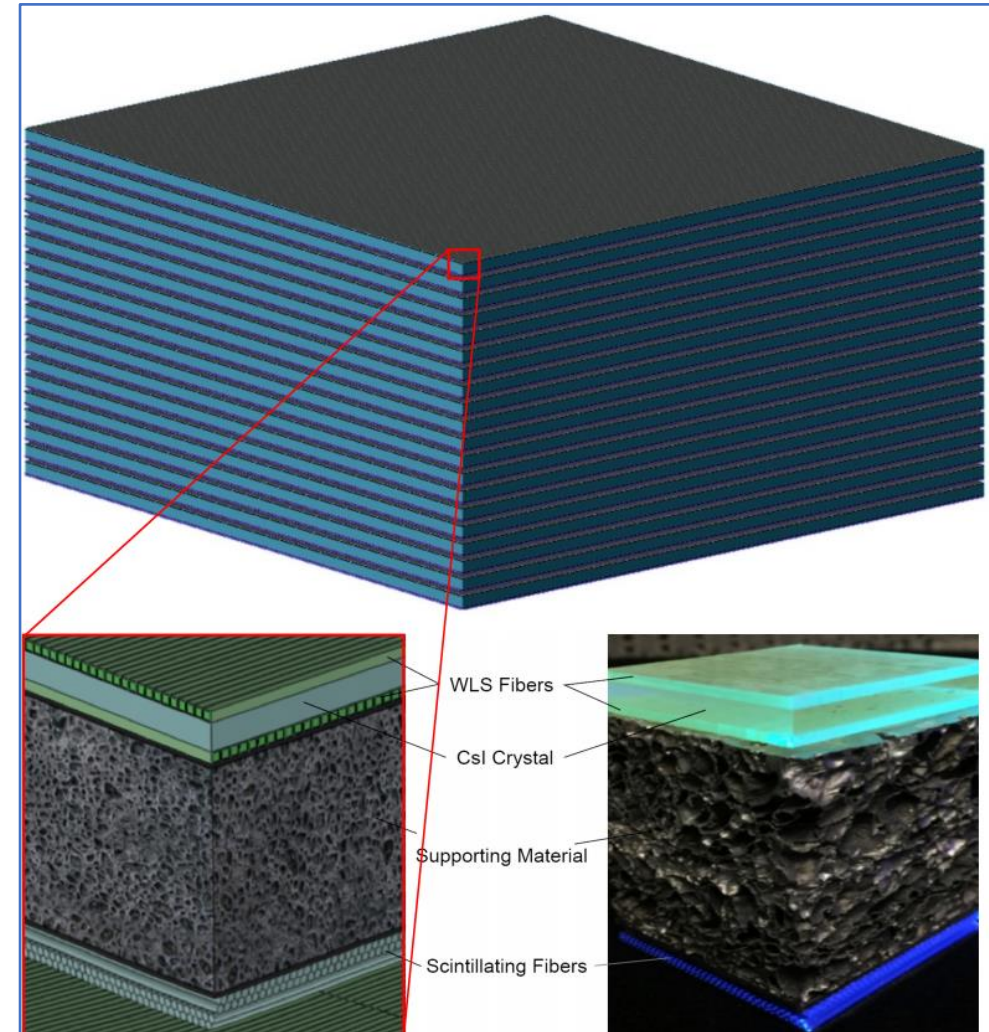


**Wenlei Chen¹ and James H. Buckley² on behalf
of the APT Collaboration***

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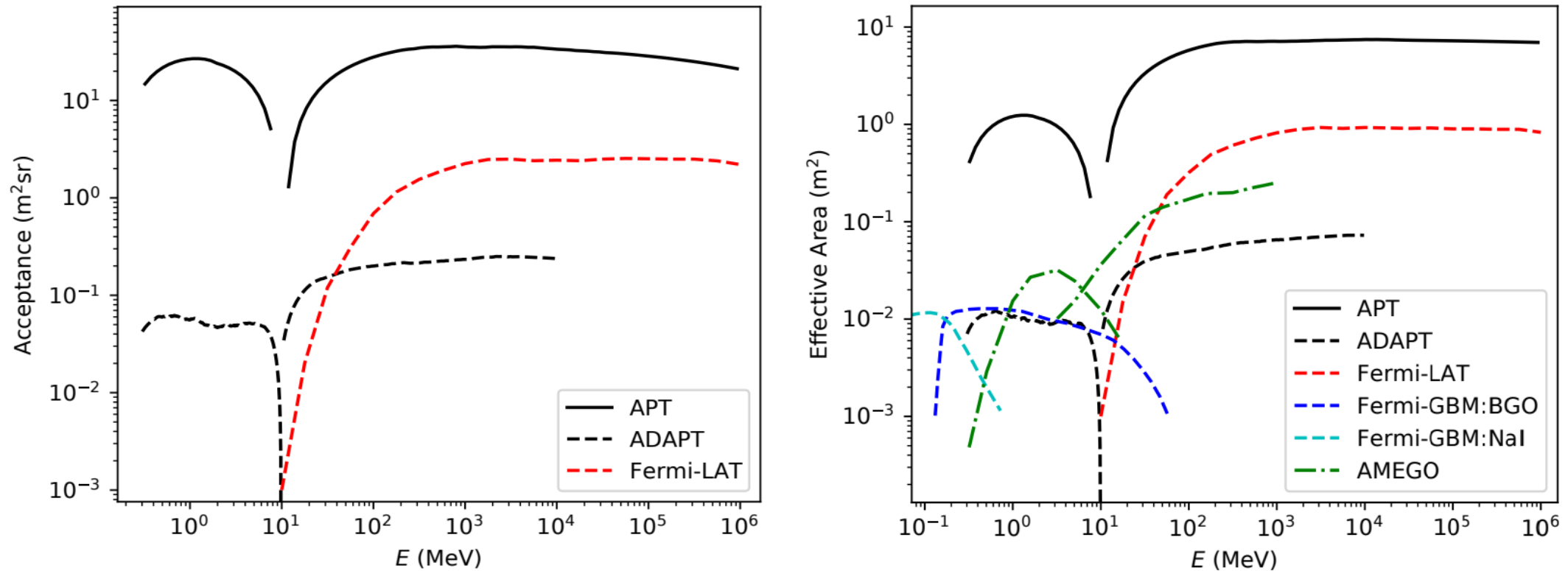
The Advanced Particle-astrophysics Telescope



- The Advanced Particle-astrophysics Telescope (APT) is a high-energy gamma-ray and cosmic-ray mission concept. The instrument design is aimed at maximizing effective area and field of view for MeV-TeV gamma-ray and cosmic-ray measurements.
- The Antarctic Demonstrator for APT (ADAPT) is a balloon experiment using a small portion $\sim 1\%$ of the APT detector. The ADAPT experiment will demonstrate the potential of our instrument concept and test our gamma-ray and cosmic-ray reconstruction algorithms.



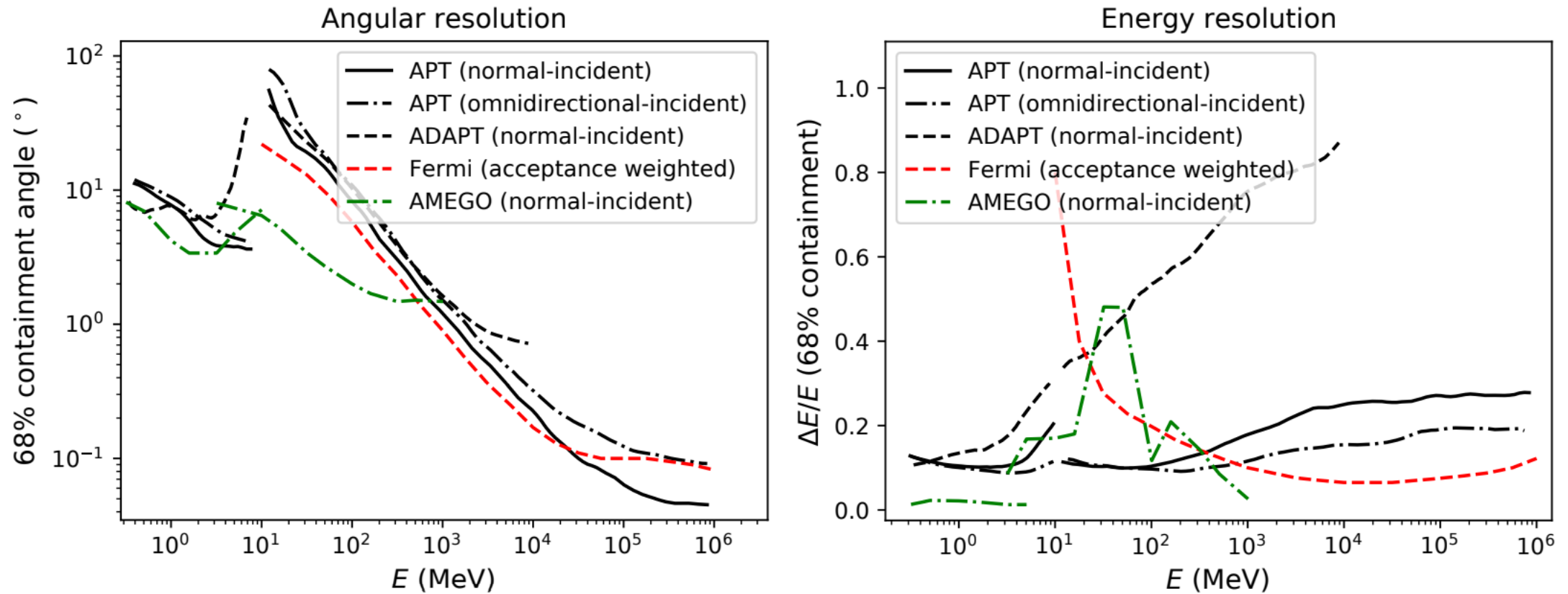
Geometric Factor and Effective Area



Acceptance/geometry factor (left) and normal-incident effective area (right) versus energy. The lower energy solid black curves denote APT Compton reconstruction and the higher denote APT pair reconstruction. Dashed red and dash-dotted green curves are for Fermi P8R2_SOURCE_V6 events and AMEGO, respectively. Dashed blue and cyan curves show the Fermi-GBM effective area for the BGO and NaI detectors, respectively.



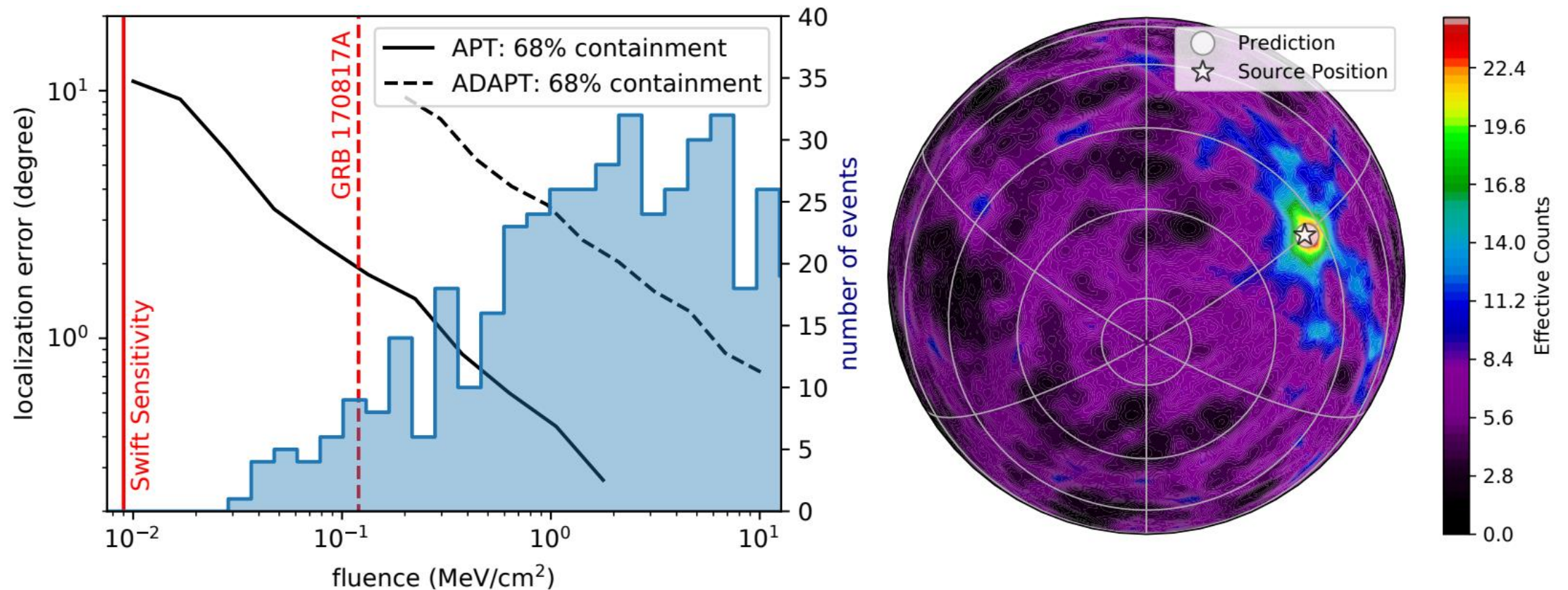
Angular and Energy Resolution



Angular resolution (left) and energy resolution (right) as shown by the 68% containment versus energy. Solid and dash-dotted black curves are for APT with normal- and omnidirectional-incident events. Dashed black, red, and dash-dotted green curves are for ADAPT, Fermi P8R2_SOURCE_V6 events, and AMEGO, respectively.



Gamma-Ray Burst (GRB) Localization

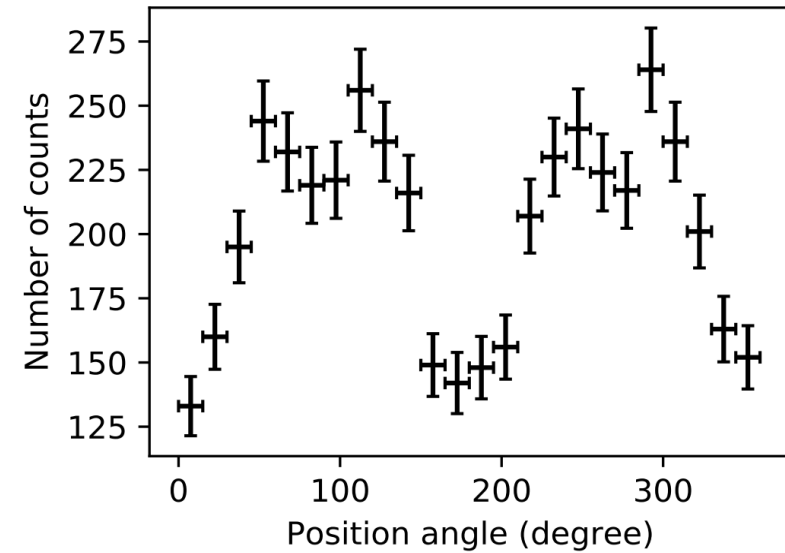
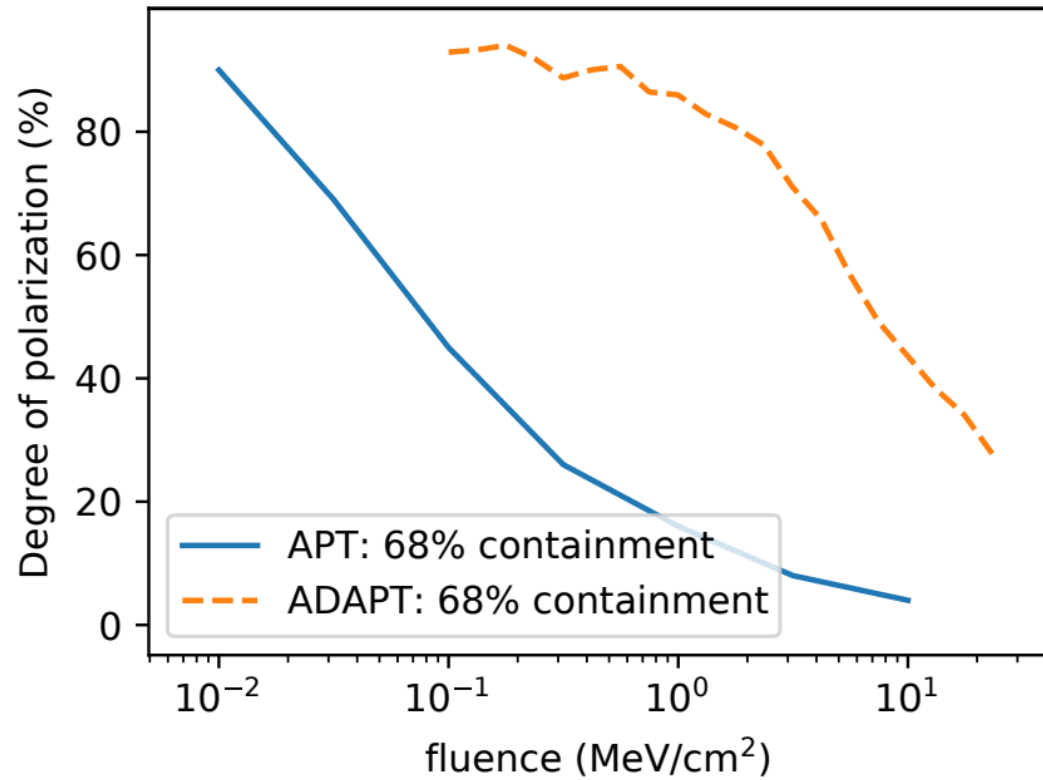


Left: Error in reconstructed direction of a Band-spectrum GRB versus fluence. The red solid and dashed line shows the estimated fluence of Swift sensitivity limit and GRB170817A/ GW170817 event in the APT energy range. Histogram shows the count rate of GRBs from the first Fermi-GBM catalog in the energy range from 10 keV to 1 MeV. Right: An example Compton sky map of a 1 MeV/cm^2 GRB detected by the ADAPT.



GRB Polarization

3-sigma DOP sensitivity of the APT and ADAPT as a function of the GRB fluence.



Distribution of scattered gamma-rays detected by the ADAPT as a function of azimuthal position angle for an example of linear polarized GRB (along 0-180°) with fluence of 1 MeV/cm².

