



Recent Gamma-ray Results from DAMPE

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th ICRC, Madison WI, U.S

Outline

- Introduction of DAMPE
- Fundamental works for gamma-rays
- Scientific results for gamma-rays
- summary

DArk Matter Particle Explorer

Proposed:2005Founded:23 Dec.Launched:17 Dec.2015

Orbit: Sun-synchronous Altitude: ~500 km



Data rate: ~5M events/day Total: ~6.5G all-particle events up to now

Scientific objectives:
(a)Probing the nature of dark matter
(b)Understanding acceleration and propagation of cosmic rays
(c)Studying γ-ray emission from Galactic and extragalactic sources

The payload



- Charge measurement (dE/dx in PSD, STK and BGO)
- Pair production and tracking (STK and BGO)
- Precise energy measurement (BGO bars)
- Hadron rejection (BGO and NUD)

The rare gamma-rays in the cosmic rays











See Xu et al., 2018, RAA, 18, 27 for details

Fundamental works: IRFs

- Instrument response functions (IRFs) are the parameterized representations of the instrument performance, and they are dependent on the algorithm of gamma-ray selection.
- The IRFs of DAMPE are factorized into three parts: (a) the effective area, (b) the point-spread function (PSF) and (c) the energy dispersion function.



See Duan et al. [arXiv: 1904.13098] for details















Overall performance

Energy Range	2 GeV - 10 TeV
Field of View	~ 1 sr
Effective Area (normal incidence)	~ 1200 cm^2 @ 100 GeV
Angular Resolution (normal incidence)	0.1°@ 100GeV
Energy Dispersion (normal incidence)	~1% @ 100 GeV

Data collected in the first three years

- Six full-sky scans
- ~0.2M photons (>2GeV)



Bright gamma-ray source list

- Blind search for all-sky bright sources
- Events from 2 GeV to 2 TeV
- TS map within 0.1° pixels



Bright gamma-ray source list

• Sensitivity of source detection for 3 years



Integral flux sensitivity



Broadband sensitivity Galactic center, intermediate latitudes, north Galactic pole, and north Celestial pole



See Shen et al. [PS1-256(ICRC2019)] for details



Galaxy clusters



See Shen et al. [PS1-256(ICRC2019)] for details



See Shen et al. [PS1-256(ICRC2019)] for details

Pulsars



Obtained from: https://apod.nasa.gov/apod/ap180317.html





See Muñoz et al. [GAD2d(ICRC2019)] for details

GeV variable AGNs



See ATel #9901, #11246, #12562, #12705 for details

Summary

- More than three years' sky-survey observation
- All-sky blind search with 3-year data above 2 GeV reveals 143 bright sources with TS > 20.
- No statistically significant line is identified between 10 GeV and 300 GeV and upper limits of <σv> are obtained.
- Further analyses are being carried, along with more data collected as well.

Thanks for your attention!