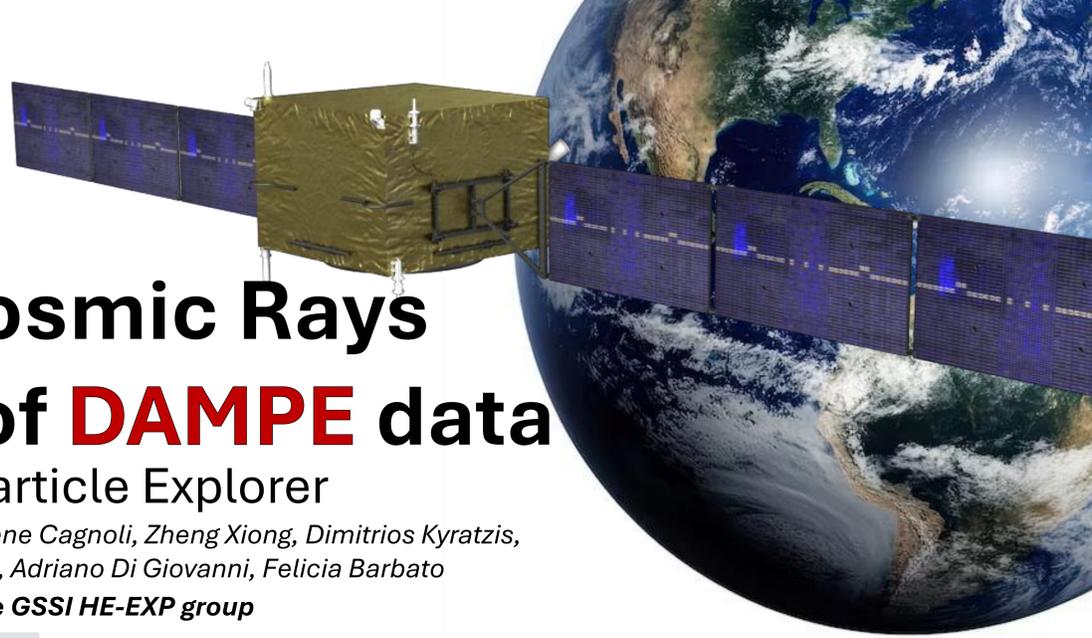




# Galactic Cosmic Rays with 10 years of DAMPE data

## DARK MATTER PARTICLE EXPLORER

Sara Fogliacco\*, Elisabetta Casilli, Irene Cagnoli, Zheng Xiong, Dimitrios Kyrtziz, Pierpaolo Savina, Ivan De Mitri, Adriano Di Giovanni, Felicia Barbato  
on behalf of the GSSI HE-EXP group



### The Space Mission

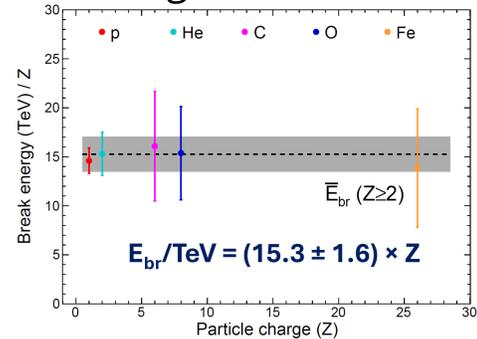
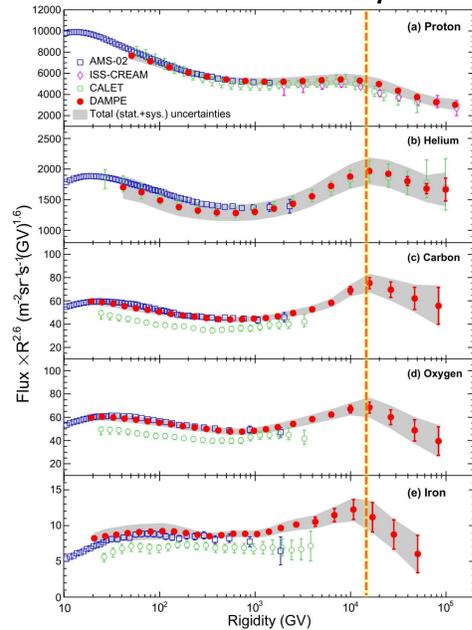
### Research Goals

### DAMPE Results & current GSSI activities

- International collaboration, China, Italy and Switzerland
- Launched on 17th December 2015
- Sun-synchronous orbit
- 500 km of altitude
- 95 min orbit period
- 10 years** of data taking in excellent working conditions

- Study of Cosmic Ray protons and nuclei**
- High energy gamma-ray astronomy
- Measure electron-positron spectrum
- Indirect search for Dark Matter

#### Spectral Softening



- Measurements of CR p, He, C, O, and Fe spectra up to ~100 TV reveal a common **spectral softening at ~15 TV**
- This provides the first observational verification for a charge-dependent limit in CR acceleration

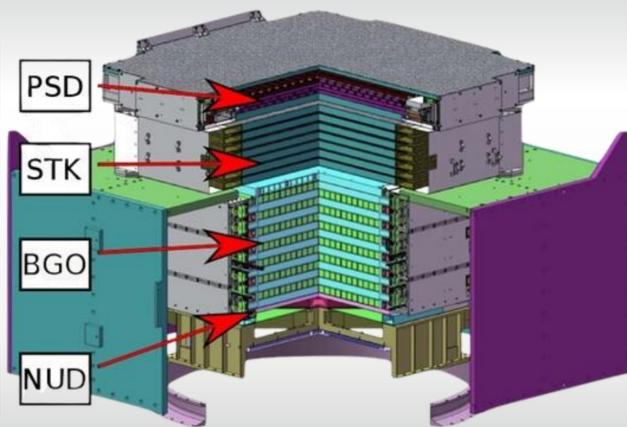
Charge-dependent spectral softenings of primary cosmic-rays from proton to iron below the knee  
DAMPE Collaboration, 2511.05409 [astro-ph.HE], submitted to Nature

Charge measurement and  $\gamma$ -ray veto

Track reconstruction and  $\gamma$ -ray conversion in  $e^-e^+$  pairs

Energy measurement

Discrimination between EM and HAD showers



### Spectral Analyses Highlights

a) Use on-orbit & MC datasets

b) Preliminary selection

e.g. exclusion of the South Atlantic Anomaly, BGO fiducial volume, rejection of side-entering CR, etc

c) Track selection

d) Charge selection

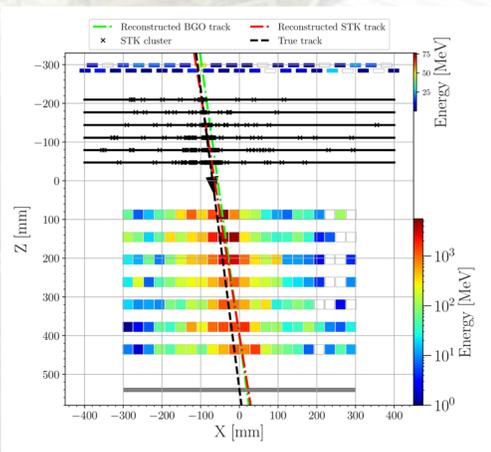
e) Unfolding

reconstruction of the primary nucleus energy spectrum

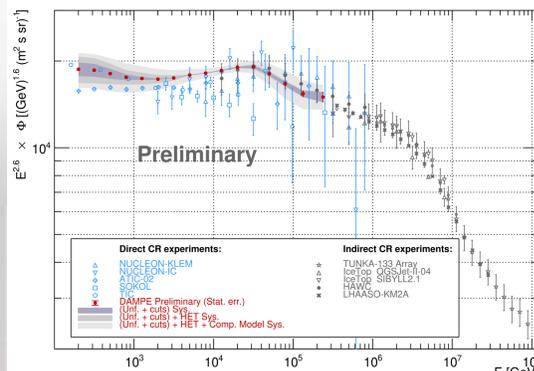
f) Background estimation

g) Estimation of the statistical and systematic uncertainties

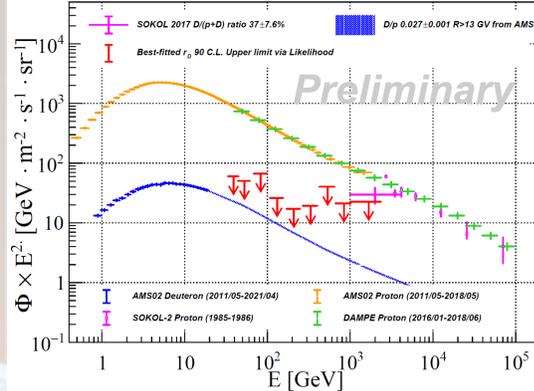
<b>Geometric Acceptance</b>	~ 0.3 m <sup>2</sup> sr
<b>BGO thickness</b>	32 X <sub>0</sub> (~ 1.6 $\lambda_1$ )
<b>Energy Resolution</b>	1.2 % at 100 GeV (e/ $\gamma$ ) <40% at 800 GeV (nuclei)
<b>Detection</b>	up to 15 TeV (e/ $\gamma$ ) up to ~ PeV (p/nuclei)



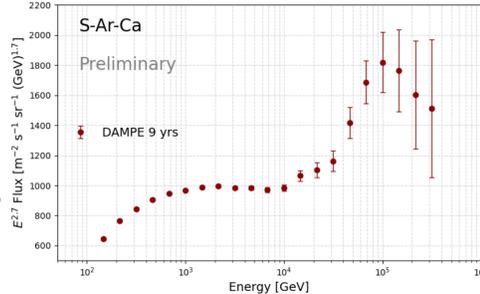
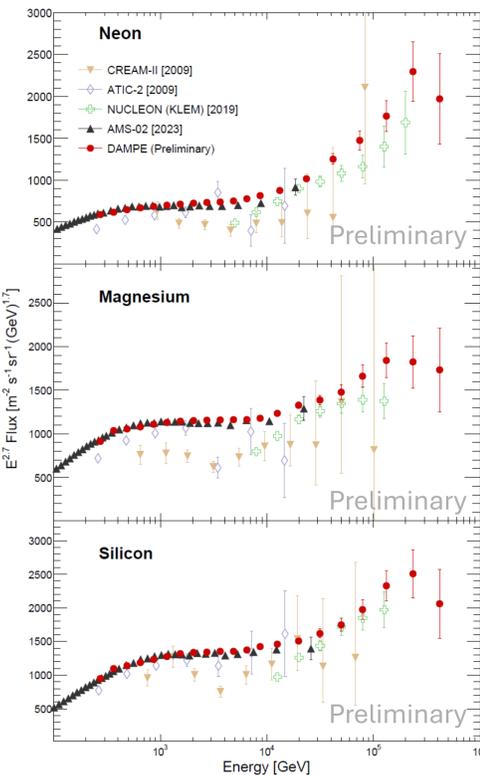
#### All Particle



#### Deuteron

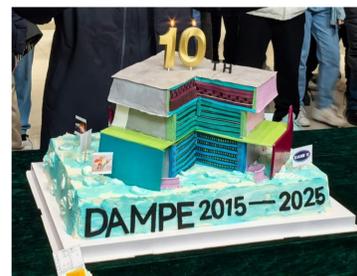
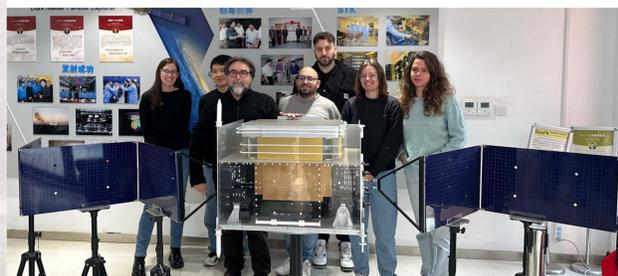


#### Medium-High Mass Nuclei



#### Ongoing Analyses:

- Study of the all-particle cosmic ray spectrum  $\rightarrow$  Irene
- Study of the medium high mass nuclei (Z=10-20)  $\rightarrow$  Elisabetta and Sara
- Discrimination on proton-deuteron flux  $\rightarrow$  Zheng



10 yrs DAMPE anniversary in Nanjing

Join to have a slice!