GRAN SASSO SCIENCE INSTITUTE
SCHOOL OF ADVANCED STUDIES
Scuola Universitaria Superiore

INFN LNGS

Measurement of the energy spectrum of cosmic iron nuclei with DAMPE

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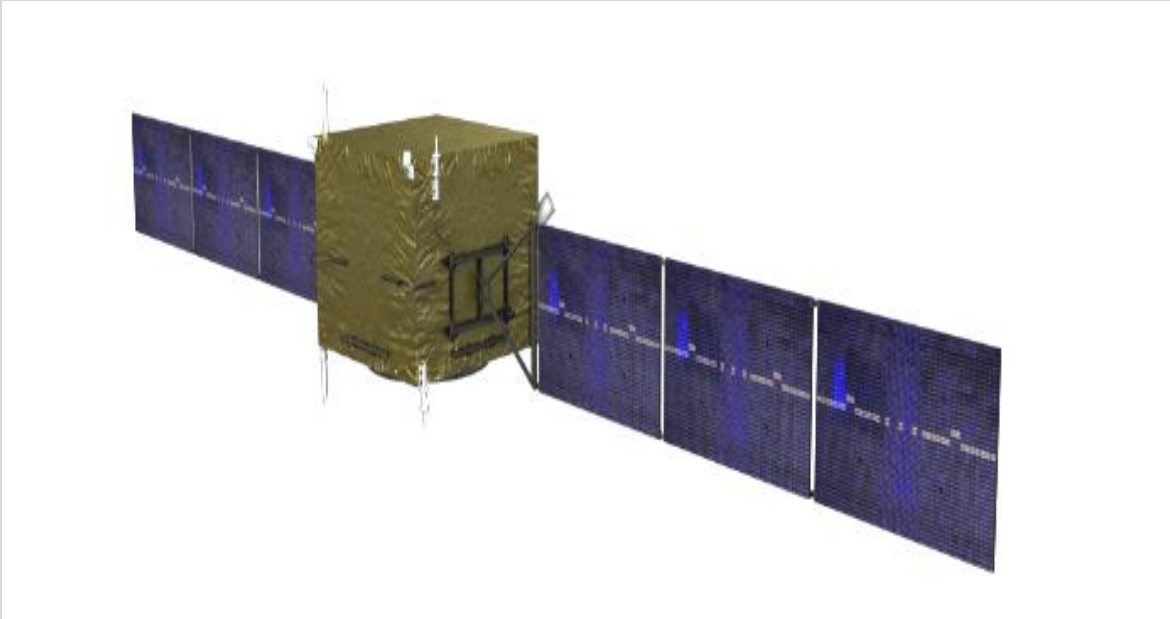
DAMPE Detector

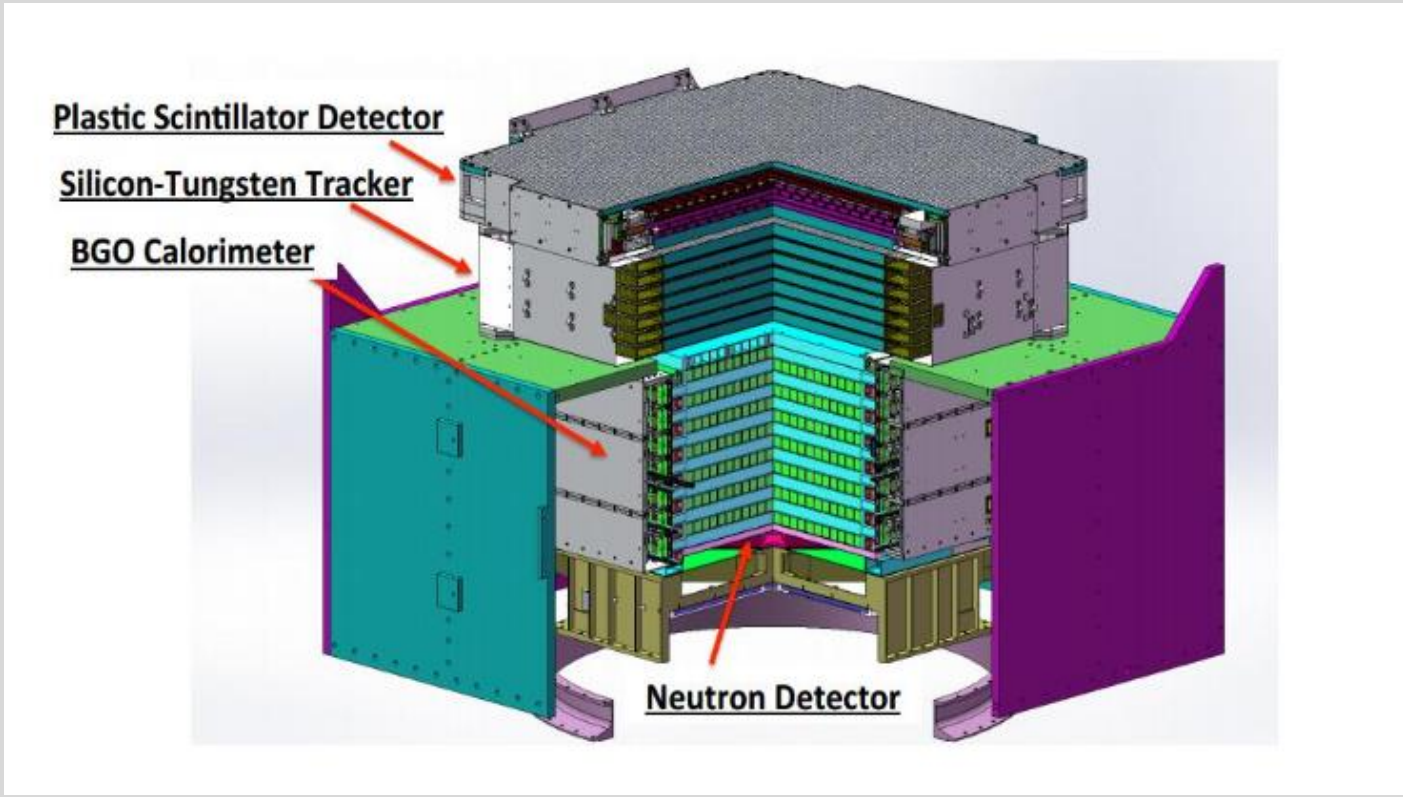
- Space based particle detector
- Sun-synchronous orbit
- Altitude ~ 500 km
- Launch date: 17 Dec. 2015
- Weight: 1400 kg
- Power Consumption: 400 W



DAMPE Detector

From top to bottom:

- PSD (Plastic Scintillator Detector) is used for charge measurement and gamma anticoincidence
- STK (Silicon-Tungsten tracKer) is used for track reconstruction
- The BGO (Imaging) Calorimeter can reconstruct an image of the shower and provide particle energy measurements
- Neutron Detector is used to improve the hadronic shower discrimination power against electronic ones



Data collection and preselection

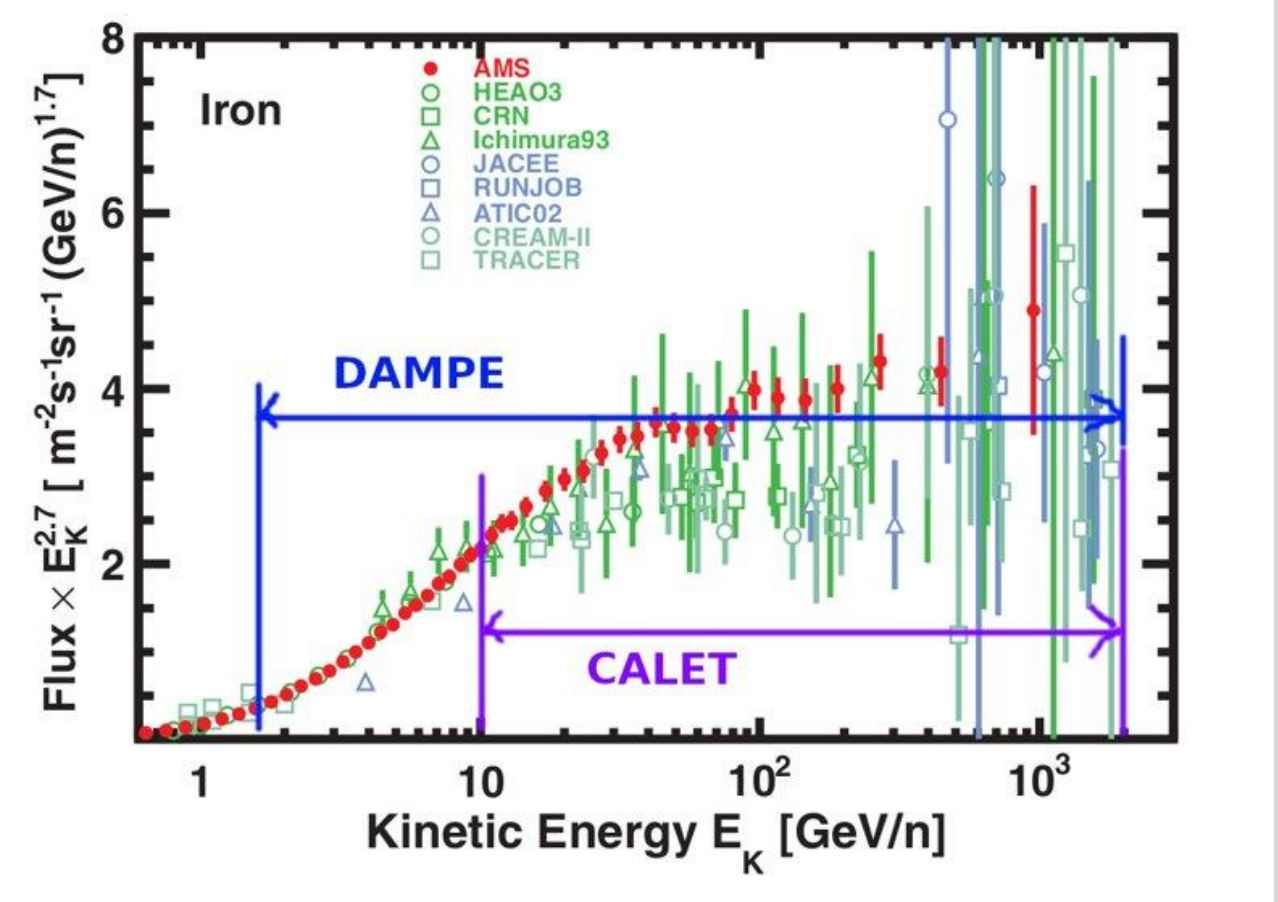
- Raw data are collected and sent to ground with a rate of ~ 15 GB/ day
- Reconstructed data are produced @ ~ 85 GB / day
  - Events that are correctly reconstructed with track fully contained inside the detector are accepted
- For this analysis data are collected and reconstructed from 1 Jan 2016 to 31 Dec 2020
- Montecarlo data are produced in the energy range 10 GeV – 100 TeV, and preselected using the same cuts of physics (flight) data

DAMPE Energy range on Fe

The performances of the detector allow us to reach the following results

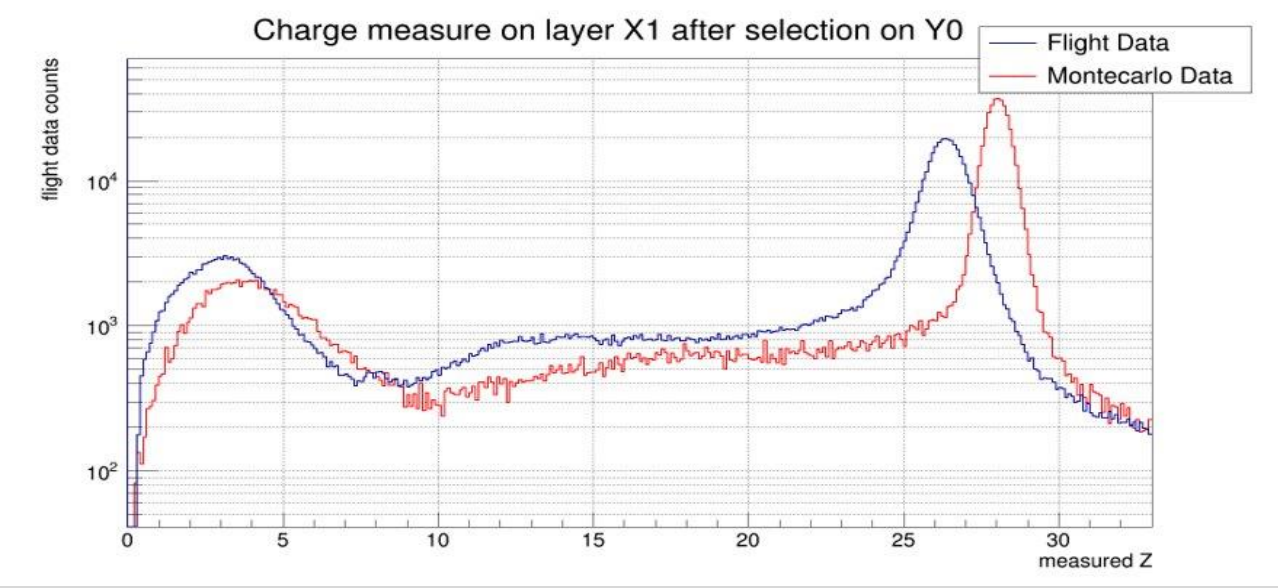
- Low energy limit due to geomagnetic cutoff: 2 GeV / n
- Low statistics limit: 2 TeV / n

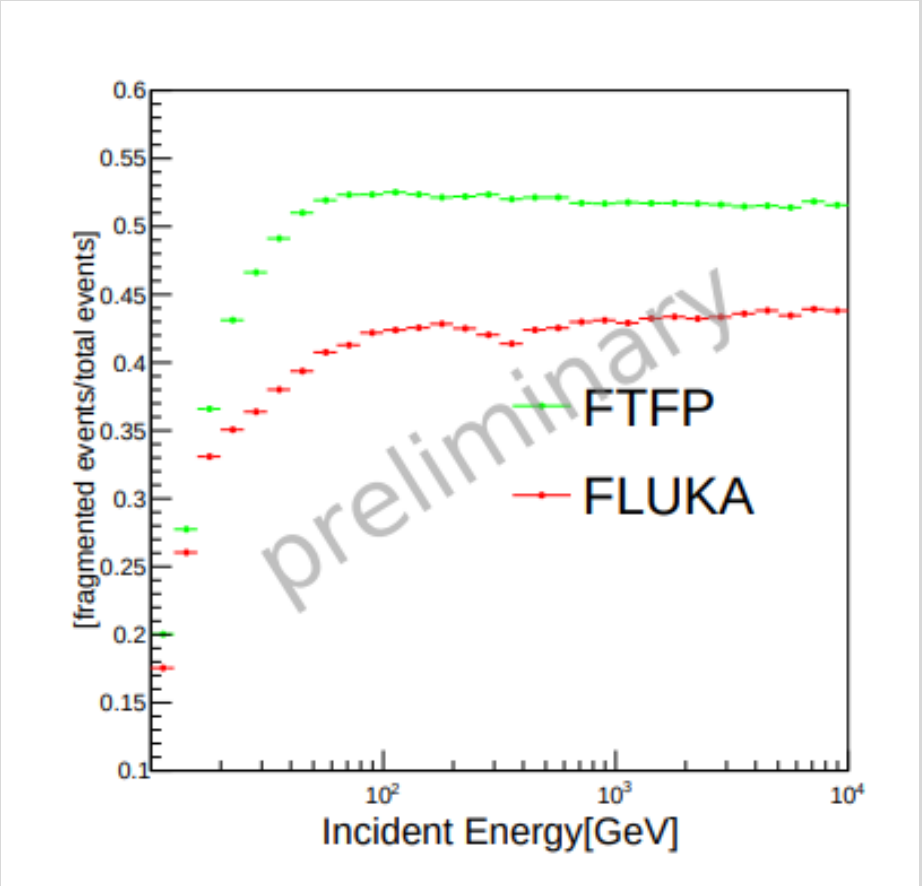
Fragmentation might reduce the statistics especially at higher energy



Fragmentation in PSD

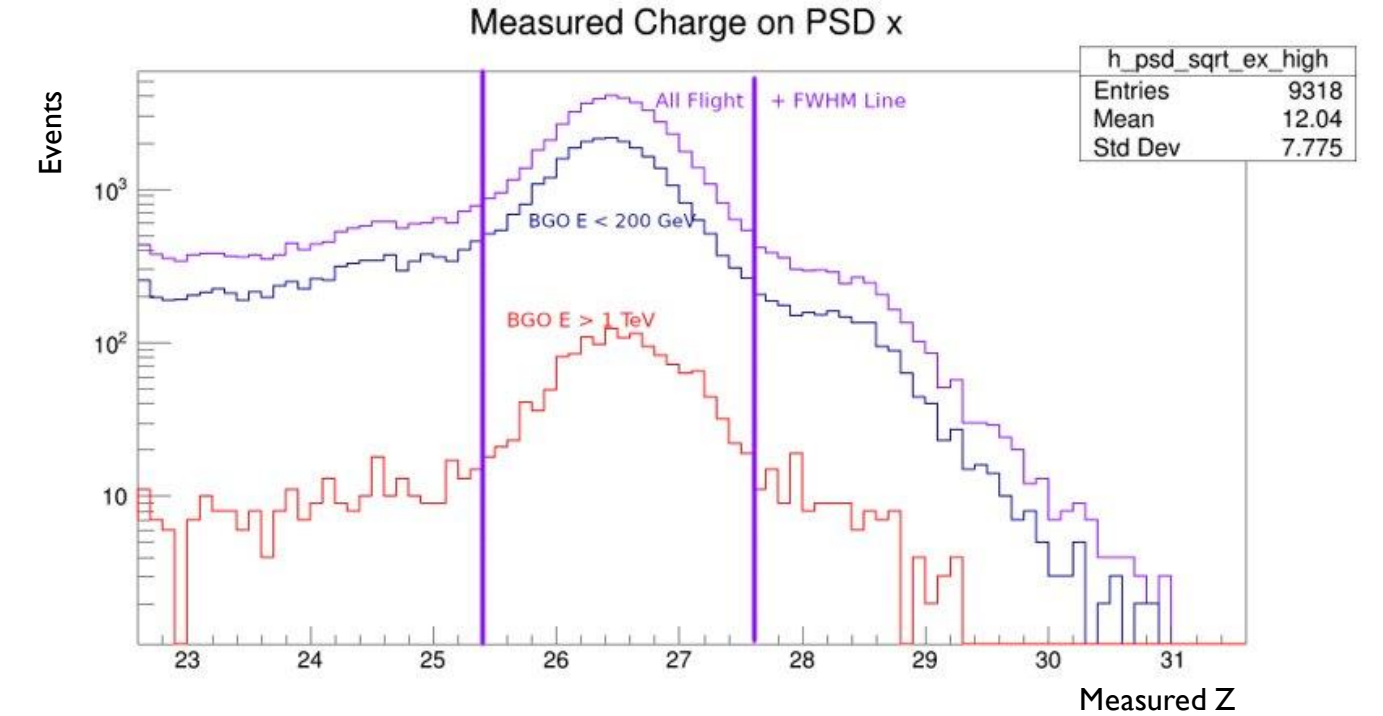
- Fragmentation roughly constant for E > 100 GeV in montecarlo data
- Similar trending on bottom layer after Fe selection on top layer for montecarlo and flight data (considering a charge shift)





Results (work in progress)

- The Iron peak position is quite consistent for both lower and higher energy particles
- The events passing this cut are going to be used in the unfolding procedure, together with more cuts refining the purity of the sample,



Thank you for the attention!