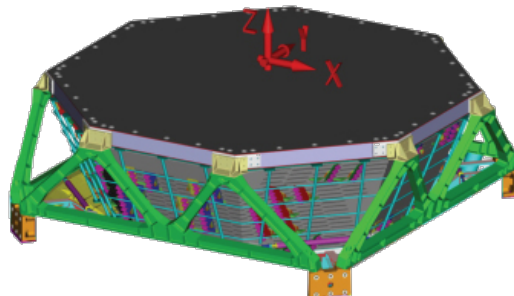


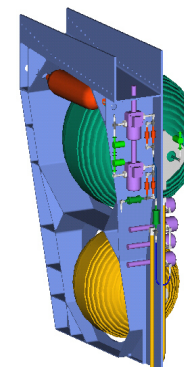
Operation of the AMS-02 TRD in Space – Francesca Spada, INFN Rome

The AMS-02 detector was installed on May 2011 on board of the International Space Station and has since collected billions of Cosmic Ray events. AMS will measure with high precision Cosmic Ray spectra up to the TeV energy scale. The Transition Radiation Detector, filled with a Xe/CO₂ mixture, is used to reach the sensitivity to positron identification needed for the detection of a neutralino dark matter candidate.

Radiator material: 22 mm fleece of polypropilene fibers
Detecting material: 5,248 Ø 6 mm straw tubes filled with a [80:20] Xe/CO₂ mixture
Gas supply: > 20 years



TRD: 5,248 Pulse Heights
Precision TRD Gas System: 482 Temperature Sensors, 8 Pressure Sensors
Onboard processing: 30 computers



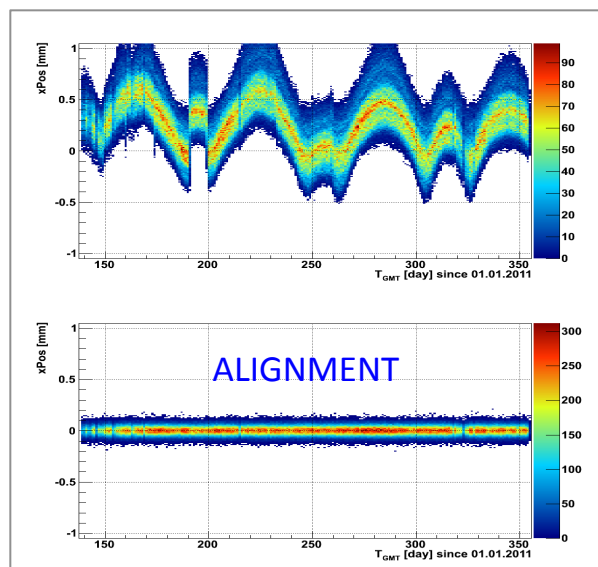
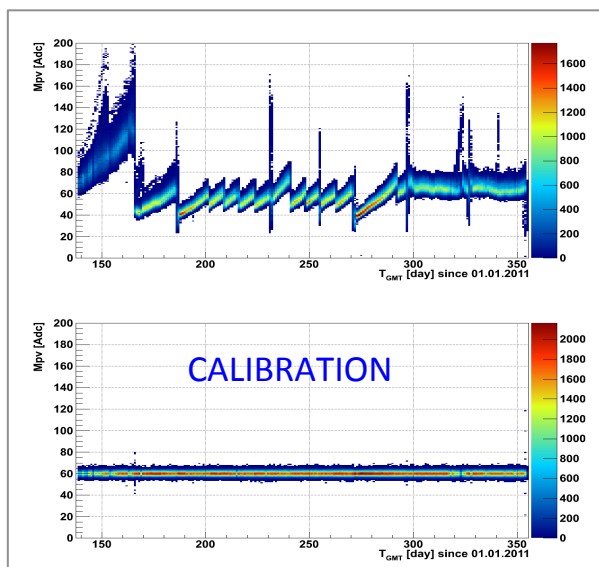
Xe storage [48 kg]

CO₂ storage [5 kg]

Due to temperature, pressure, gas composition and HV changes, the TRD detector response is changing too.

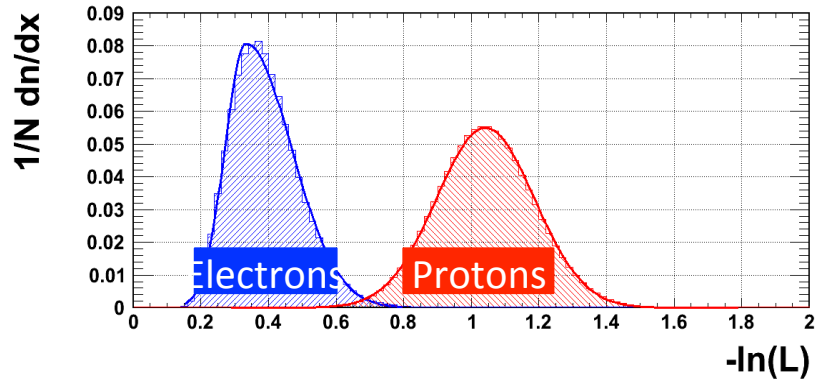
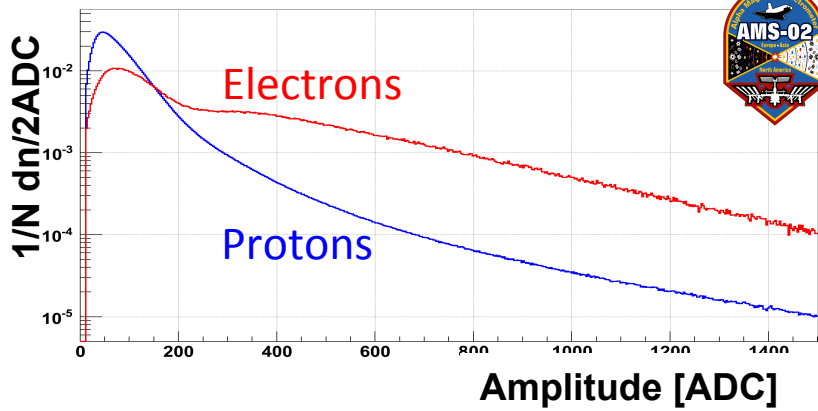
Due to temperature variations, the TRD is moving on top of the inner tracker by up to 1 mm.

We use CR protons to equalize the TRD response to homogeneity within 3%, and align each straw module with an accuracy of 0.04 mm.

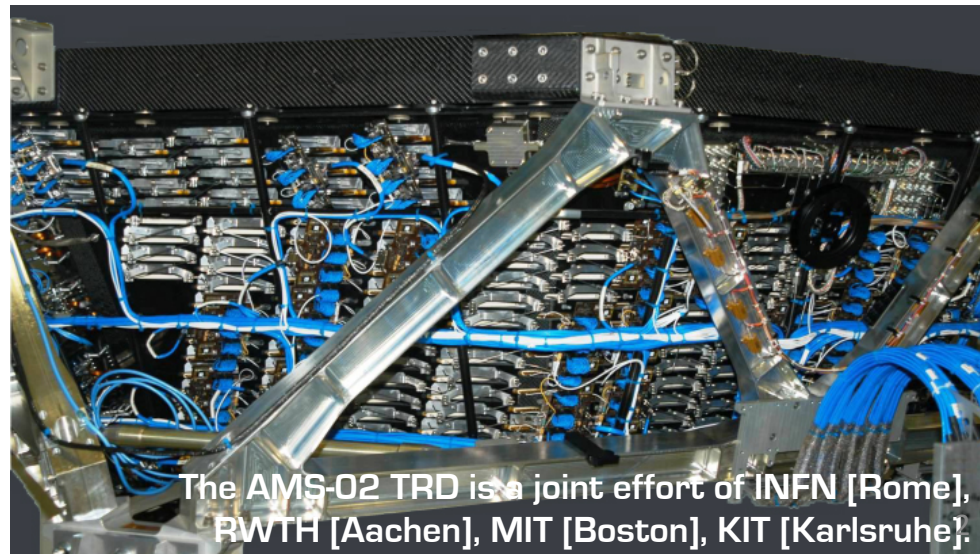
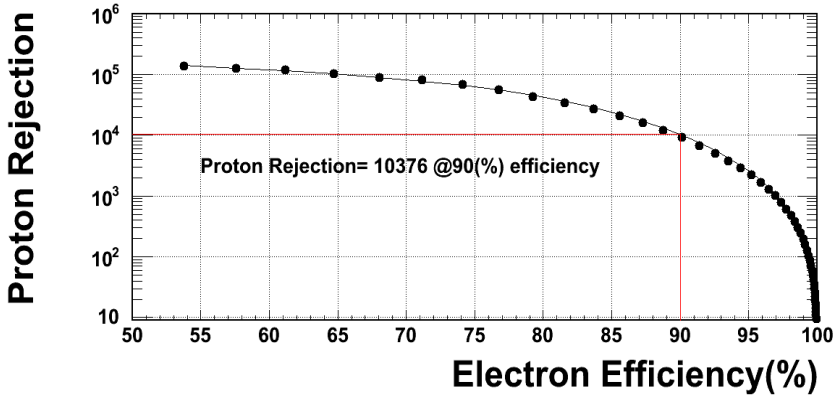
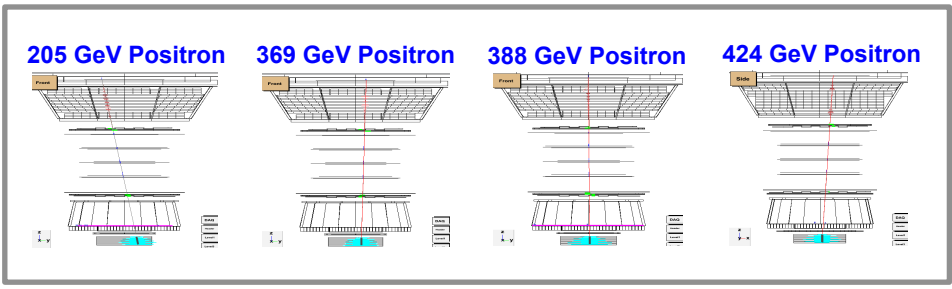




The AMS Tracker and EM Calorimeter can be used to define separate, clean Electron and Proton samples. This allows to study the TRD response in Space and determine the particle identification power from flight data directly! The different response at the single tube level is due to transition radiation. In the data analysis, the electron/proton separation is based on a likelihood method.



The rejection factor obtained ensures the AMS-02 capability to reach the desired sensitivity on the positron spectrum on the whole interesting energy range, even at very high energies.



The AMS-02 TRD is a joint effort of INFN [Rome], RWTH [Aachen], MIT [Boston], KIT [Karlsruhe].