

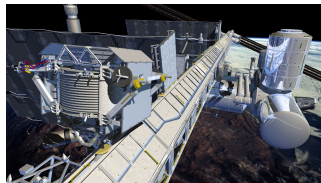
AMS and RICH status

Activity report

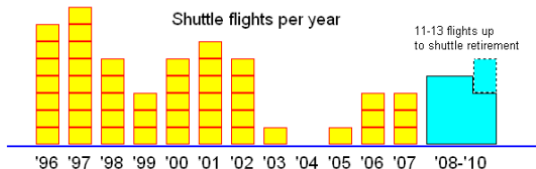
LIP/AMS group

LIP/IST - Lisboa, Portugal

11 Janeiro, 2008



AMS: a long schedule...



1998

AMS-01 flight



2003

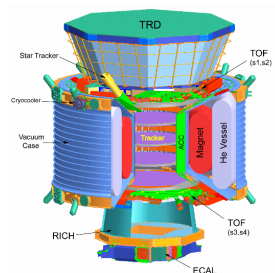
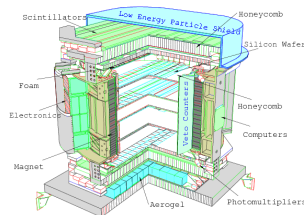
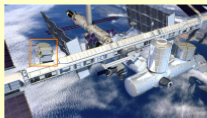
Columbia disaster

PAMELA
BESS-polar

GLAST
AGILE

2010?

AMS-02 to ISS



AMS: scenarios...

Measurement	statistics	energy range	physics goals
e^+	10^7	1-400 GeV	Dark Matter
$\bar{p}$	10^6	0.5-200 GeV	
$\bar{D}$	~ 10	0.1-8 GeV/A	
γ -ray	10^5	$1\text{-}10^3$ GeV	Astrophysics
D	10^8	0.1-8 GeV/A	
^3He	10^8	0.1-8 GeV/A	
^{10}Be	10^5	0.1-7 GeV/A	
Measurement	sensitivity	rigidity range	physics goals
$\overline{\text{He}}/\text{He}$	10^{-9}	$0.5\text{-}10^3$ GV	Antimatter
$\overline{C}/C$	10^{-8}	$0.5\text{-}10^3$ GV	

3 years Flight Scenario

What happens (to physics!!!) if there is no flight???!!...

- ▶ Antimatter
- ▶ Darkmatter search
 - ▶ positrons
 - ▶ antideuterons
- ▶ Cosmic rays
 - ▶ isotopic ratios (H, He, Be)

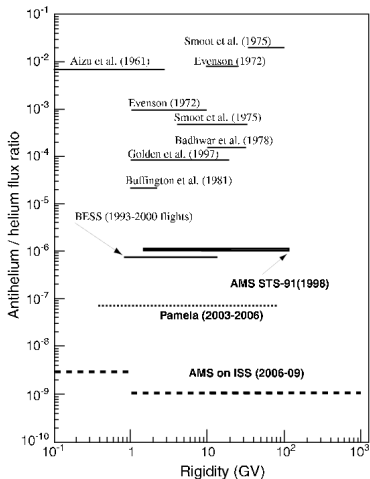
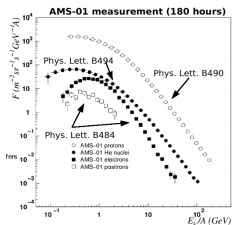
AMS: antimatter

Search for antinuclei, most likely antihelium events.

$$N_X = \int \Phi_X(E) \text{Acc}(E) dE dt$$

$$\sim \langle \text{Acc} \rangle \left(\frac{\Phi_0}{\alpha} E_{\min}^{1-\alpha} \right) \underbrace{\int dt}_{\Delta t}$$

Exp.	Acc. ($\text{m}^2.\text{s.r}$)	Δt	$E_{\min}$
AMS	0.4	$5 \times 10^7 \text{ s}$	0.1 GeV/n
PAMELA	0.2×10^{-2}	$5 \times 10^7 \text{ s}$	0.1
BESS	0.3	10^6 s (flight)	0.1



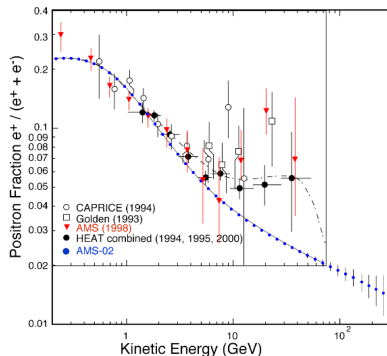
$$\text{Ratio} = \frac{N_{\text{He}}(95\text{CL})}{N_{\text{He}}}$$

AMS: positrons

Positrons, annihilation products of Weakly Interacting Massive Particles (WIMPS) in the galactic halo

$$\chi\chi \rightarrow f\bar{f}, WW, ZZ, \dots$$

- Some excess observed by HEAT around 10 GeV
- AMS-01 measurements up to 50 GeV



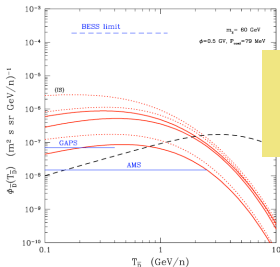
Exp.	$N_{e^+} (> 10 \text{ GeV}, 3 \text{ years})$	Sensitivity	E_{max}
AMS	4×10^5	0.2 %	400 GeV
PAMELA	4×10^3	2 %	270 GeV

AMS: antideuterons

Antideuterons, annihilation products of Weakly Interacting Massive Particles (WIMPS) in the galactic halo

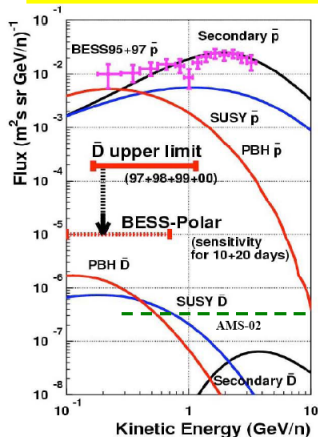
$$\chi\chi \rightarrow f\bar{f}, WW, ZZ, \dots$$

- ▶ emerged as a potential good WIMP signal
- ▶ relatively low energy



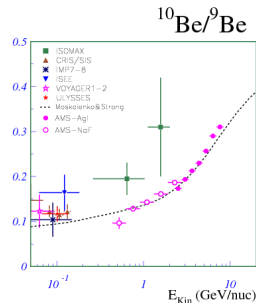
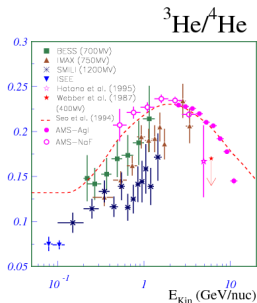
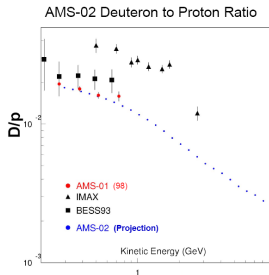
$$\phi_{\bar{d}} > \frac{1}{\text{Acc } \epsilon_{\text{geomag}} \Delta E \Delta t}$$

AMS sensitivity to anti D



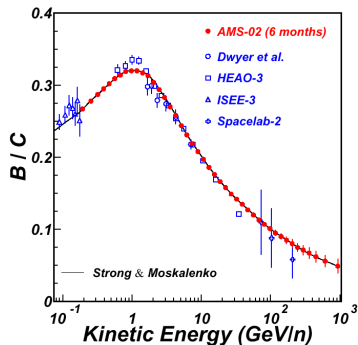
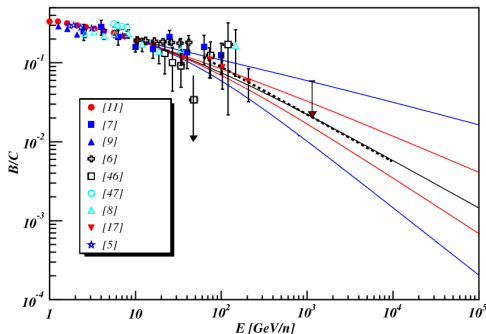
AMS: cosmic rays

- ▶ high statistics spectra measurements
- ▶ energy range strongly improved



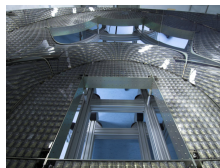
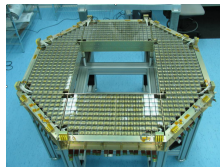
B/C measurement

- ▶ tuning of propagation models (diffusion coeff)
- ▶ larger statistics needed
- ▶ larger energy range



RICH status

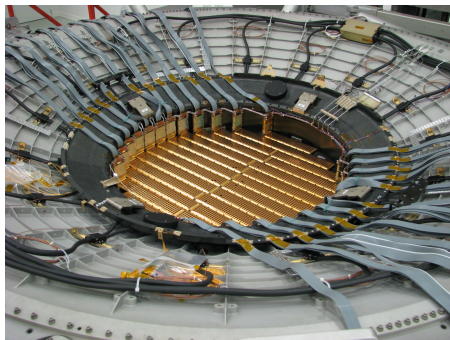
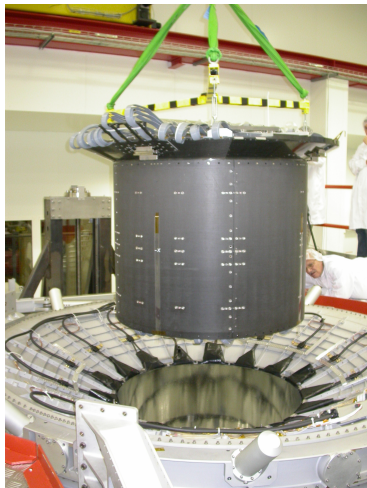
- Rich detector assembled and sent to Cern for integration (Jan/07)



RICH assembling
at CIEMAT
(Spain)

AMS status

- ▶ AMS integration in progress at Cern
- ▶ Superconducting magnet by mid 2008



Tracker insertion at Cern