B, C, and O Analysis: pass7 versus pass8

AMS-02

INFN

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Status of the Analysis (pass7)

Time Structures in Proton, Helium, Carbon, Oxygen Cosmic Rays Measured by the Alpha Magnetic Spectrometer

We present the precision measurement of time structures in 8.5 years, from Bartels rotation 2426 to 2540, of the proton, helium, carbon, and oxygen fluxes at rigidities from 1 to 60 GV based on 6.3×10^9 nuclei collected with the Alpha Magnetic Spectrometer aboard the International Space Station. We observe that the proton, helium, carbon, and oxygen fluxes show similar time variations. The flux ratio of He/(C+O), p/(C+O), and p/He are time dependent. The magnitude of these time variations decreases with increasing rigidity. The C/O flux ratio is time independent. In addition, these results allow the derivation of cosmic ray spectra outside the heliosphere in a unexplored rigidity range.

The measurement is based on 665M helium, 21.1M carbon, and 18M oxygen events collected by AMS from May 2011 to Nov 2019 (115 Bartels rotation, i.e. on a 27-day basis).

□ Analysis performed by three independent groups:

- Roma2/Perugia
- IAC-CIEMAT/Bologna
- Hawaii
- Main points:
- First time measurement of C and O fluxes vs time above 1.92 GV and updated the measurement of p and He vs time.
- All fluxes exhibit similar long-term and short-term time variation.
- C/O is constant in time at all rigidities
- p/(C+O) and He/(C+O) are not compatible with a costant value





Isotropic Differential Flux for each *Bartel Rotation* (BR), starting from May 2011 up to May 2021(135 Bartels Rotations):



- □ Isotropic Differential Flux (m² sr s GV)⁻¹
- □ Number of events: PG selections, 10 years of Pass8 Data
- □ Effective Acceptance: B1236.6_02 (Boron), B1236.6_02 (Carbon), B1236.6_02 (Oxygen)
- □ Trigger Efficiency
- **Exposure Time**
- Bin width: bins from 1.9 GV to 60 GV

Pass8: Selected Events (C&O)



Pass8 vs Pass7: Selected Events (C&O)



Pass8 vs Pass7: Raw Acceptance (C&O)



Pass8 vs Pass7: Tracking Efficiency (C)



Pass8 vs Pass7: L1Pickup Efficiency (C)



Pass8 vs Pass7: L9Pickup Efficiency (C)



Pass8 vs Pass7: Data/MC Corretions (C)



Pass8 vs Pass7: Rate (C&O)







	Boron	Carbon	Oxygen
Exposure Time	✓	<u> </u>	<u> </u>
Counts	ongoing	✓	✓
Raw Acceptance	ongoing	✓	✓
Efficiencies	—	✓	ongoing
Acceptance	—	✓	ongoing
Contamination		ongoing	
Unfolding		ongoing	
Flux		_	