Setup definition:

Nominal RICH definition with mixed radiator (AGL ⊕ NaF)

- n=1.03 AGL ⇒ 30 mm thick
- n=1.05 AGL ⇒ 25 mm thick

AGL optical params taken from latest fits to Oct2003 Test Beam data

	NOV1.03	NOV105
Clarity	0.0054	0.0055
P_{SCATT}	0.14	0.19
d?	0.019	0.014

Generated Samples:

Particles : ^{1}H, ^{4}He, ^{9}Be
Samples : 10 energy points, 20k events/sample
Distrib. : Isotropic into AMS acceptance

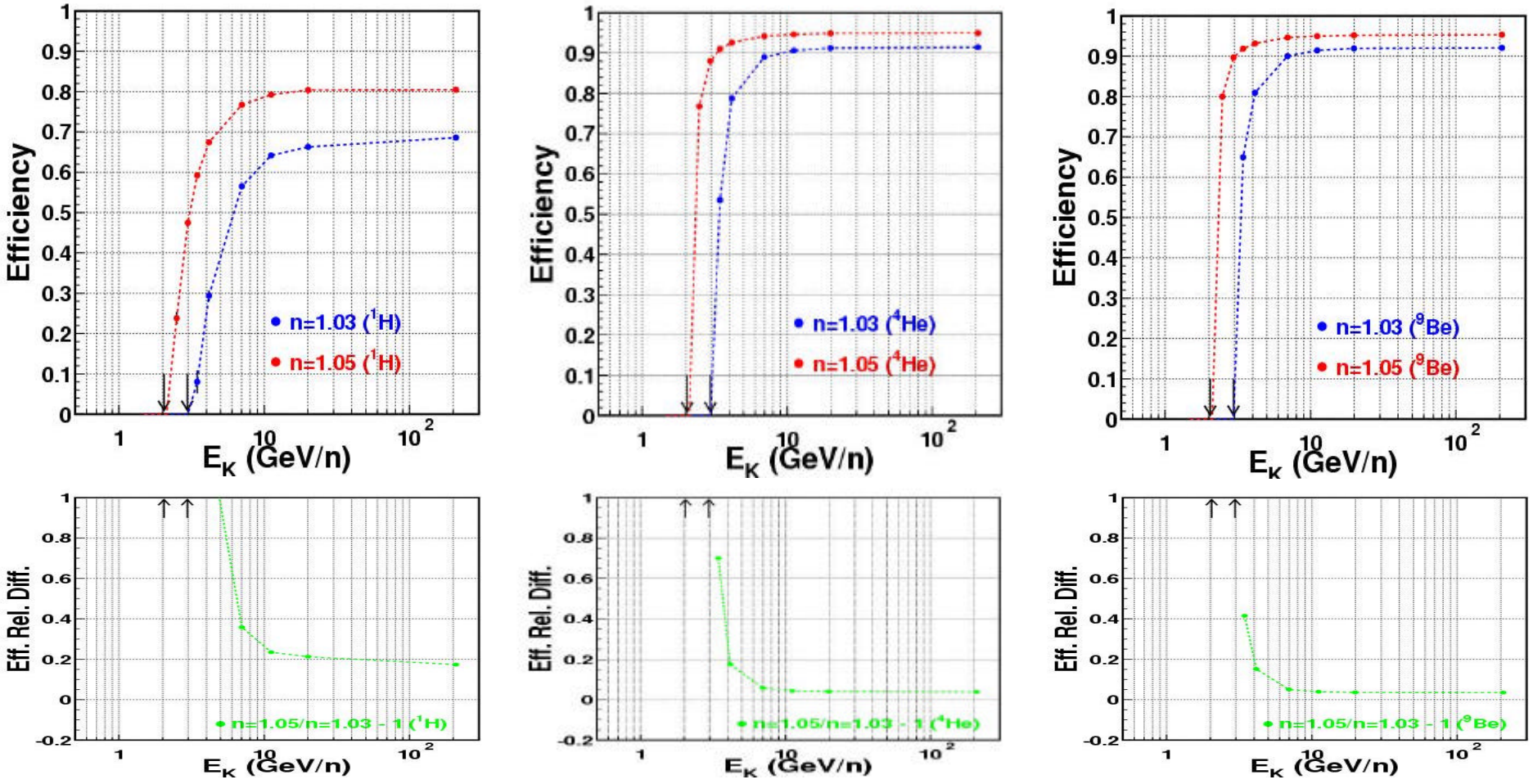
Selection criteria:

- Reconstructed event with more than 2 hits associated to the ring
- Ring pattern with enough number of expected p.e. ($N_{exp} > 1$)
- Loose quality cuts on ß and Z reconstruction (|?ß| < 3% and |?Z| < 2)

Efficiency:

Defined as the fraction of reconstructed and selected events out of those going through the radiator AGL region.

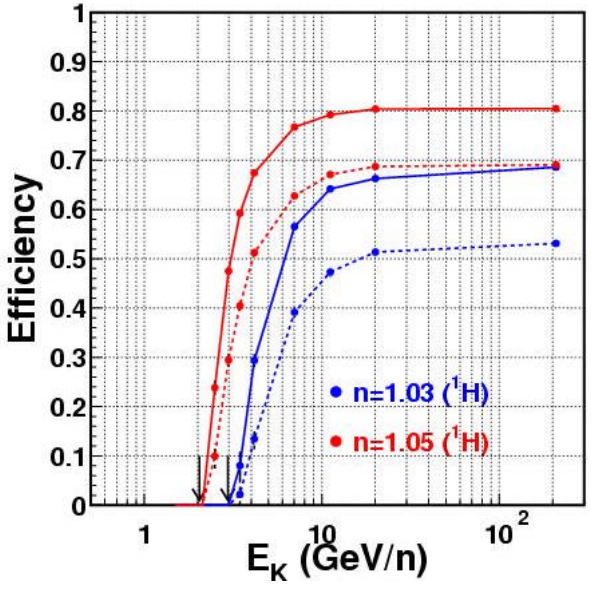
- Eff(n=1.05)/Eff(n=1.03) –1 ≥ 20% for Z=1 even for E>10 GeV/n
- Asymptotic behavior (≈5%) for Z>1

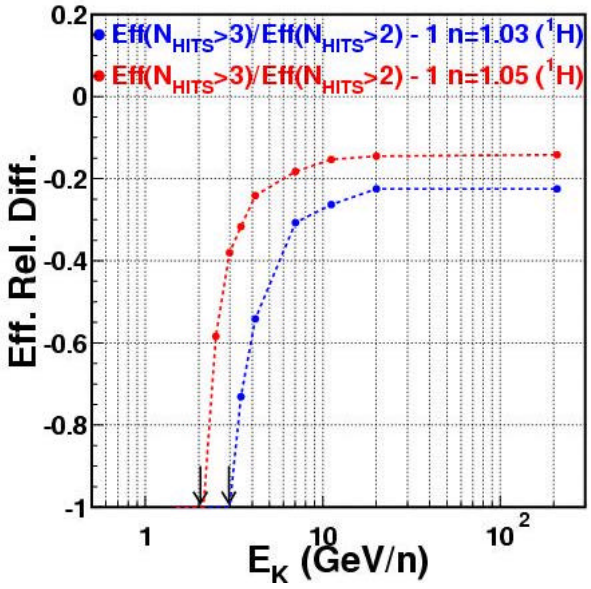


Robustness:

Estimated as the efficiency dependence either on the minimum number of hits required for the reconstruction or on an eventual decrease on the radiator photon yield, detection efficiency…

- If the minimum number of hits is increased from 3 to 4, the efficiency loss is, as expected, more important for n=1.03 (23% loss) than for n=1.05 (15% loss) for Z=1 even for E>10 GeV/n
- The efficiency reduction is for both radiators similar to the one expected from a 25%-30% loss in the photon yield

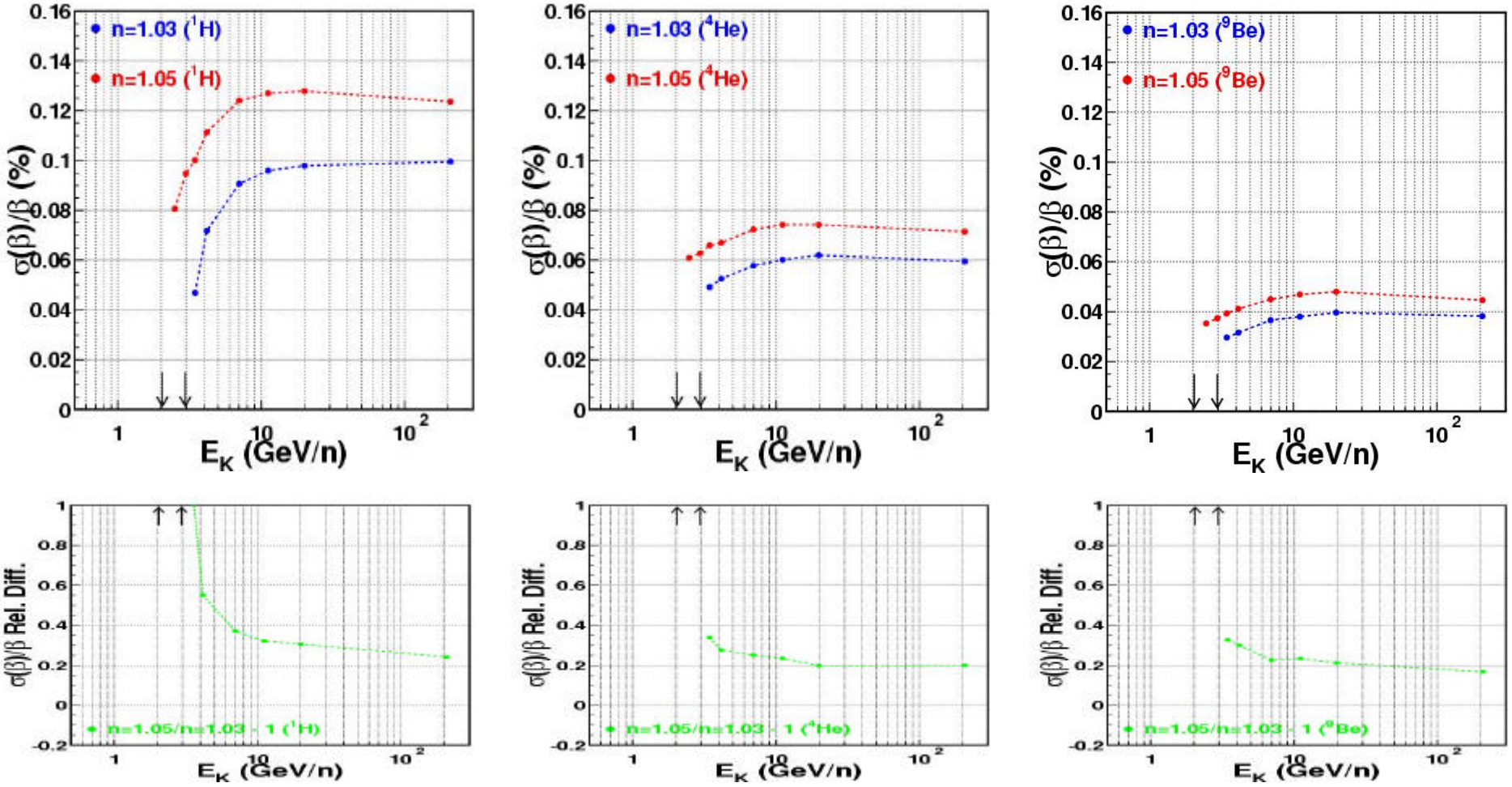




ß resolution:

Obtained from a Gaussian fit to the reconstructed velocity.

- $s_{ß}(n=1.05)/ s_{ß}(n=1.03) - 1 > 20\%$ for Z=1
- Asymptotic behavior for ($\approx 20\%$) Z>1

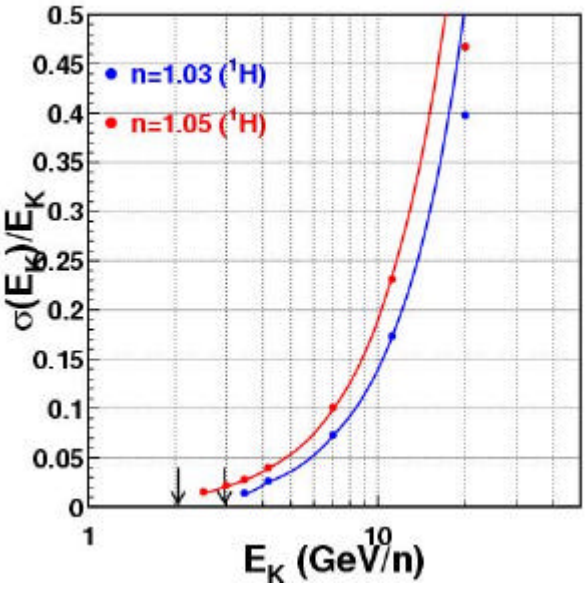


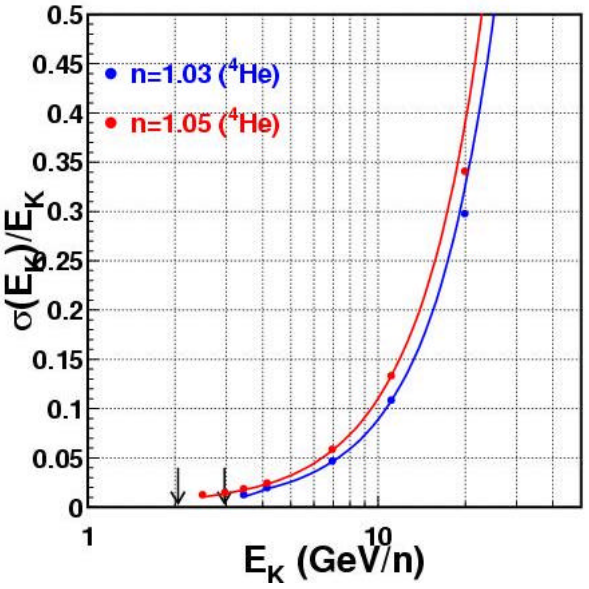
Energy resolution:

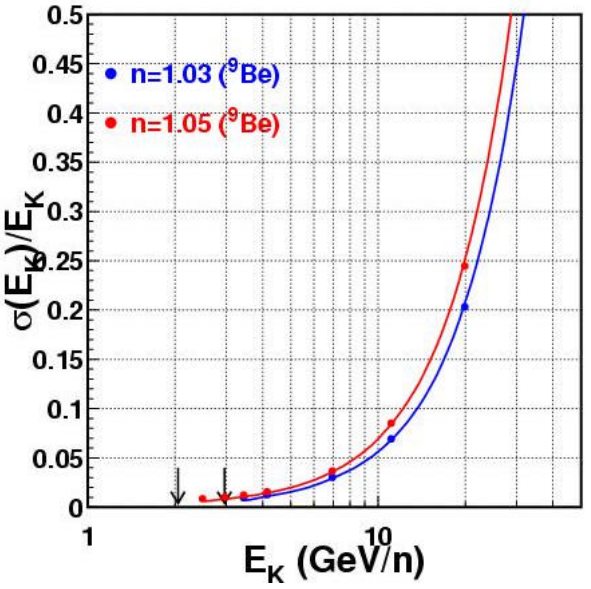
The RICH velocity measurement is a direct determination of the kinetic energy per nucleon.

The E_k resolution is obtained from a Gaussian fit to the distribution and it is in agreement with the estimation obtained from the propagation of the error on the velocity measurement.

- $s_E(n=1.05)/s_E(n=1.03) - 1 > 20\%$ for Z=1
- Asymptotic behavior ($\approx 20\%$) observed for Z>1
- Upper limit for the dynamic range (defined as the E_k where $s_E = 50\%$) is increased by 15% for Z=1 and 10% for Z>1





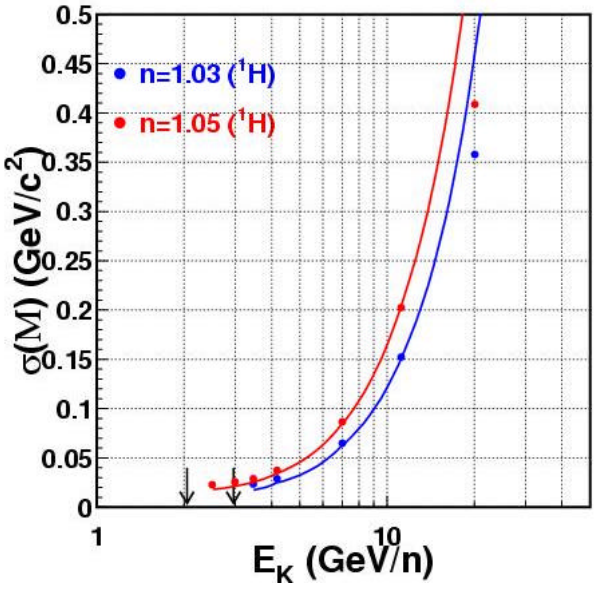


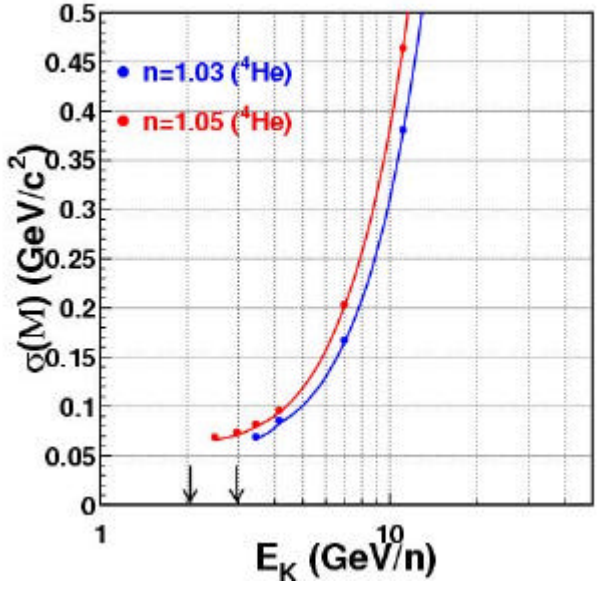
Mass resolution:

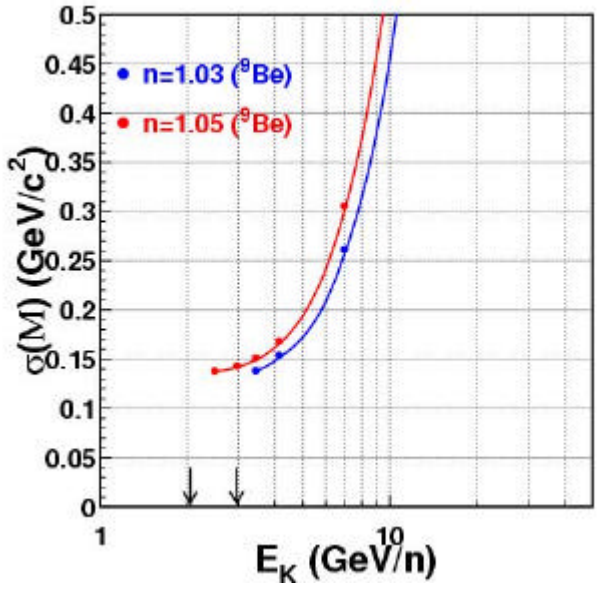
The resolution on the RICH velocity measurement is the most important contribution to the AMS mass determination at high energy.

The mass resolution is obtained from a Gaussian fit to the distribution and it is in agreement with the estimation obtained from the propagation of the error on the velocity and rigidity measurements.

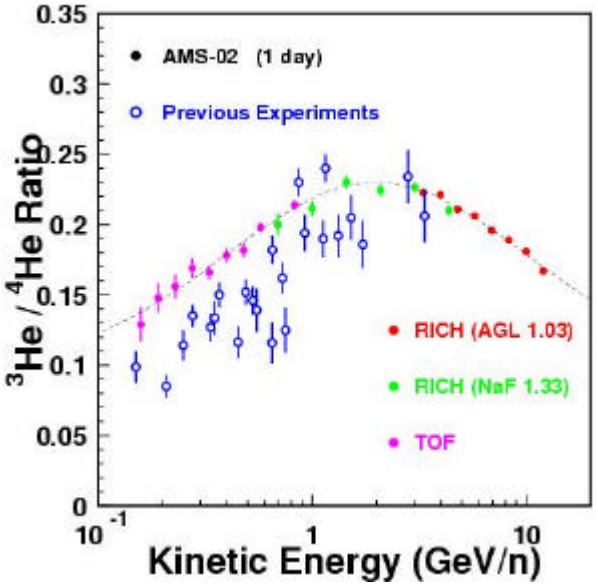
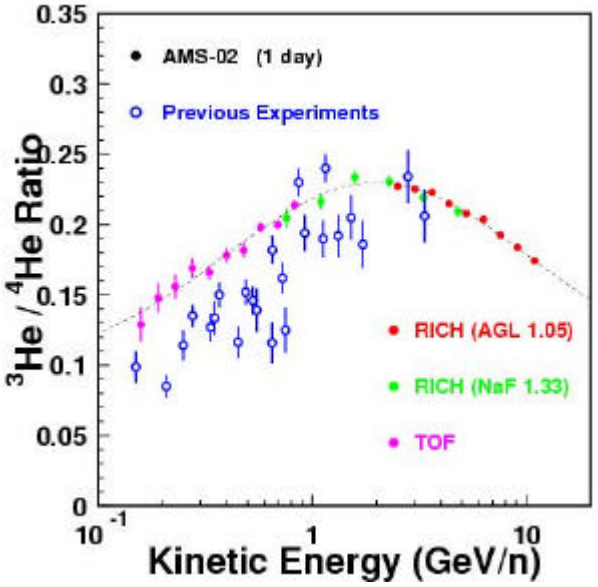
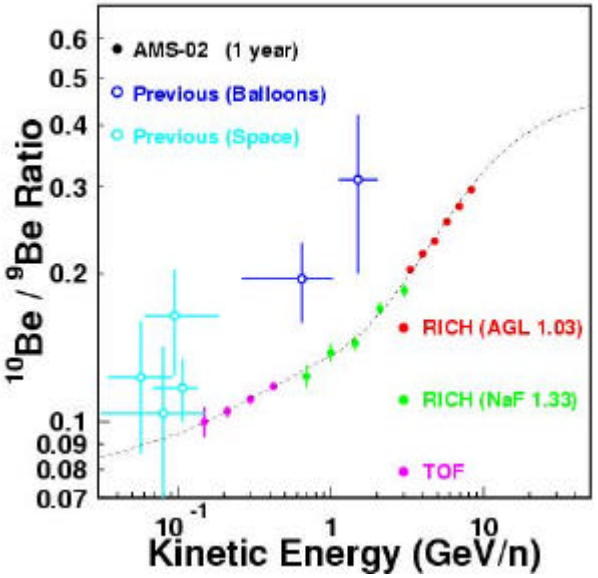
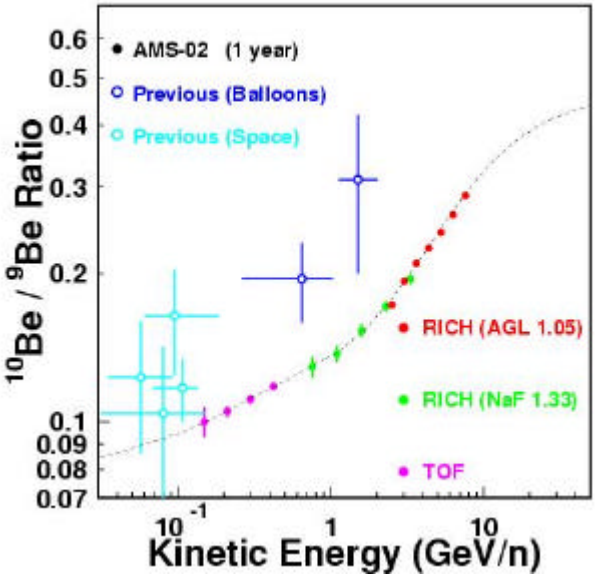
- $s_M(n=1.05)/s_M(n=1.03) - 1 > 20\%$ for Z=1
- Asymptotic behavior ($\approx 20\%$) observed for Z>1
- Upper limit for the dynamic range (defined as the energy where $s_M = 0.4$ GeV/c^2) is increased by 15% for Z=1 and 10% for Z>1







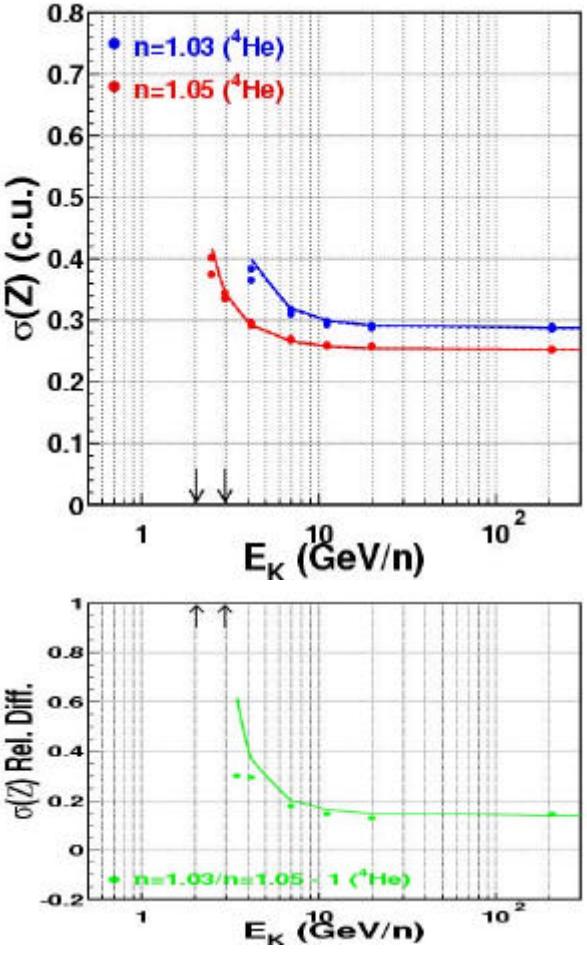
Isotope separation benchmarks:

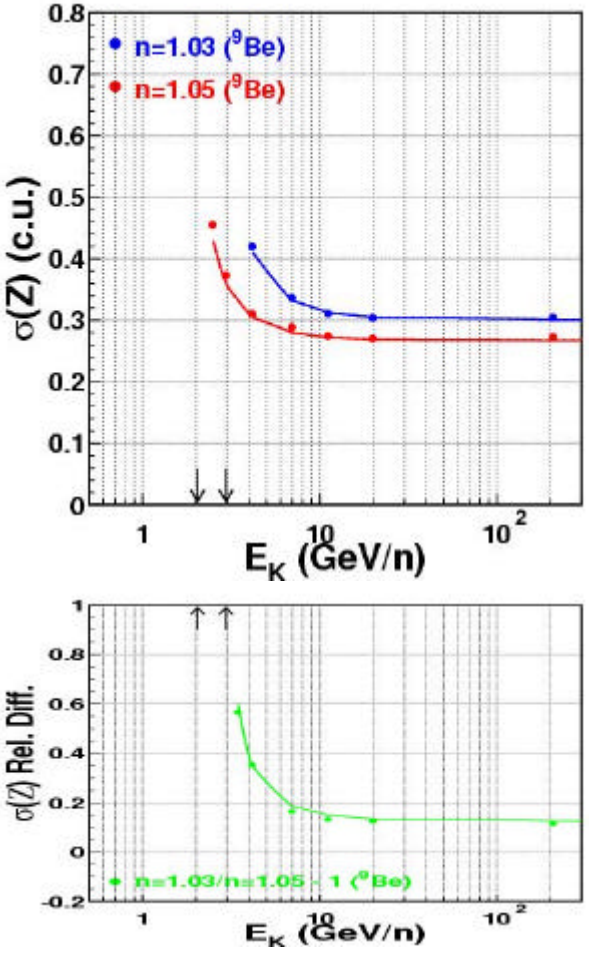
	n=1.03	n=1.05
$^3He/^4He$		
$^{10}Be/^9Be$		

Z resolution:

Obtained from a Gaussian fit to the reconstructed charge and it is in agreement with the estimation obtained from the propagation of the statistical error on the number of detected photoelectrons plus the PMT photoelectron resolution.

- $s_Z(n=1.03)/s_Z(n=1.05) - 1 \geq 15\%$ for Z>1

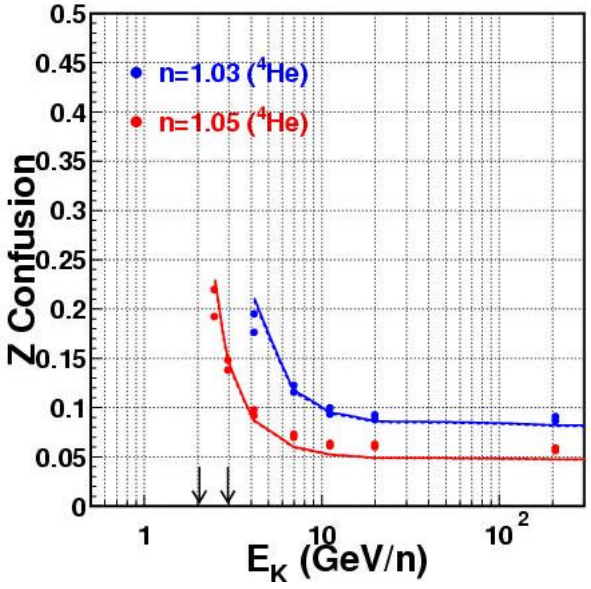


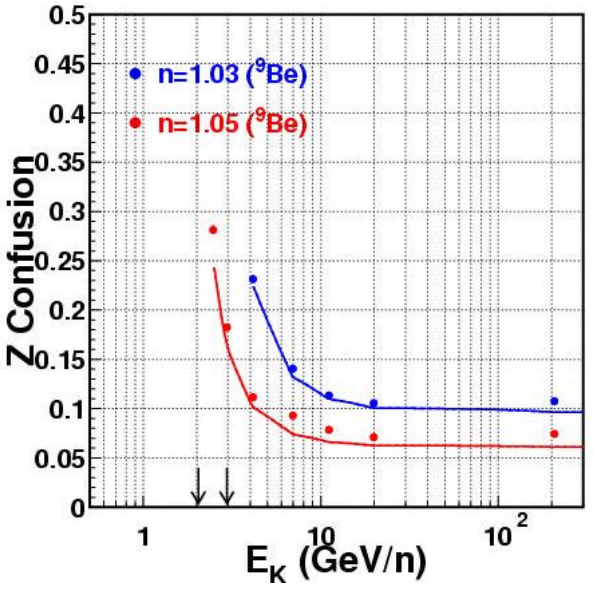


Z confusion:

Defined as the fraction of reconstructed events which are associated to a wrong charge. The data are compared to the estimation obtained from the propagation of the statistical error on the number of detected photoelectrons plus the PMT photoelectron resolution.

- CC(n=1.03)/CC(n=1.05) – 1 ≈ 50% for Z>1





n=1.03 vs n=1.05: Figure comparison:

	^{1}H		^{4}He		^{9}Be	
	n=1.03	n=1.05	n=1.03	n=1.05	n=1.03	n=1.05
Efficiency (E_k > 10 GeV/n) (%)	66	80	91	95	92	95
Efficiency (N_{HITS} > 3) (%)	51	69	90	94	92	95
ß resolution (E_k > 10 GeV/n) (%)	0.099	0.128	0.062	0.074	0.040	0.048
E_k (s(E_k) = 50%) GeV/n	20.0	17.4	25.1	22.9	31.7	28.8
E_k (s(M) = 0.4 GeV/c^2) GeV/n	19.0	16.3	11.4	10.3	9.3	8.3
Z resolution (E_k > 10 GeV/n) (c.u.)			0.29	0.25	0.30	0.27
Charge Conf. (E_k > 10 GeV/n) (%)			9.1	6.0	10.8	7.5