Dual-radiator RICH: update

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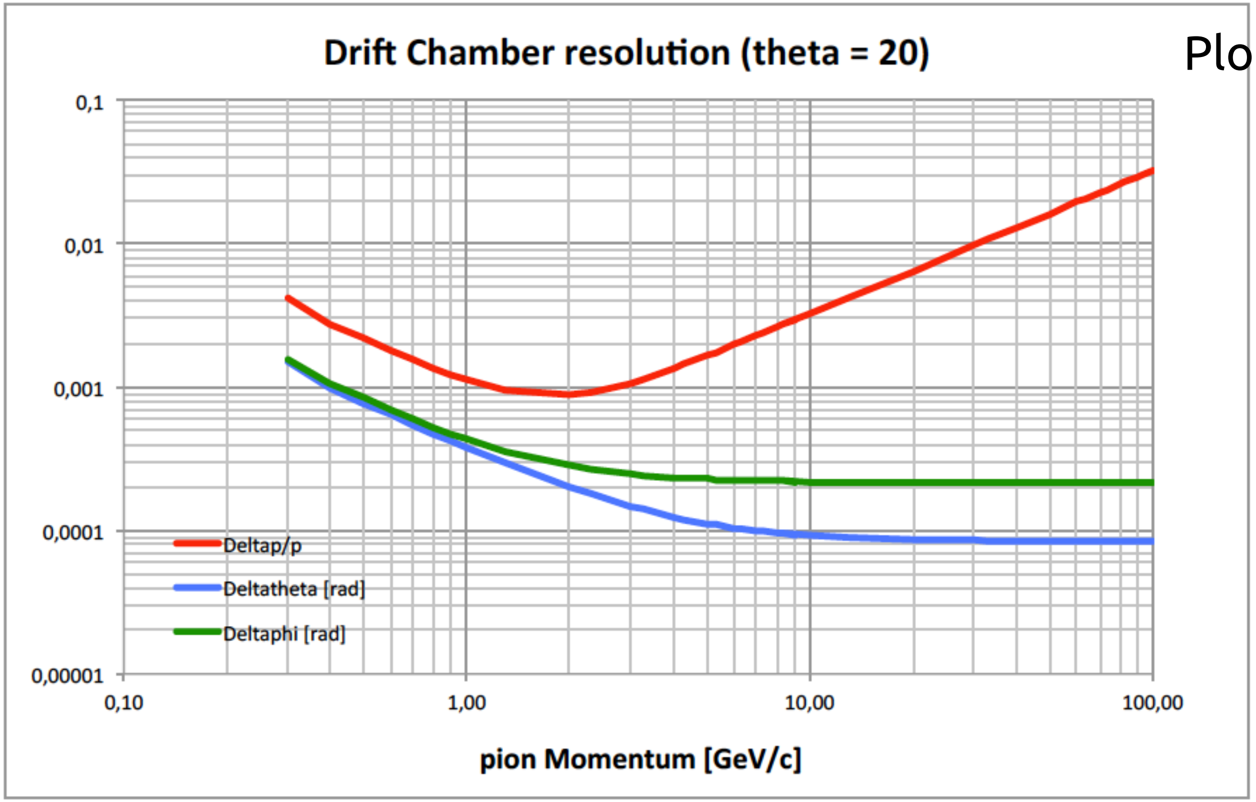
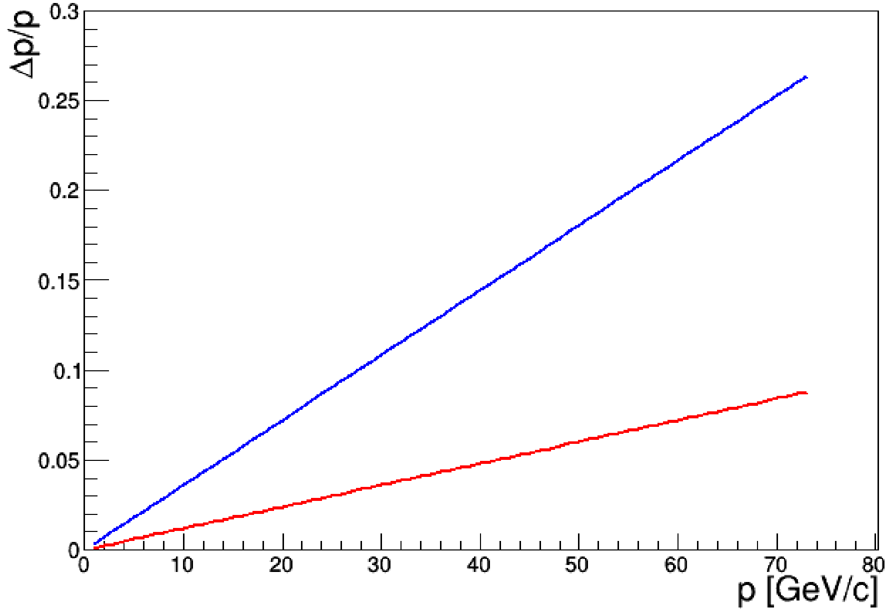
Particle track resolution effects on RICH

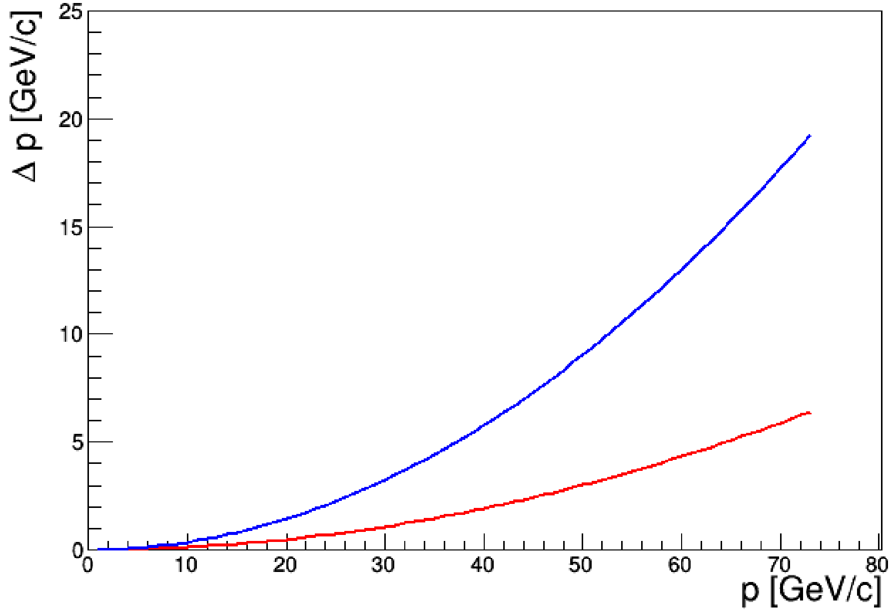


Plot by the INFN Lecce group

Assuming this information, we will use straight line for Δp/p, with different Δp in order to know a tollerance limit. At small polar angle Δp/p is expeted to grow.
For Δθ and ΔΦ we assume a constant value, again using different values to look at a tolerance limit.

Momentum and angular uncertainties of the tracks



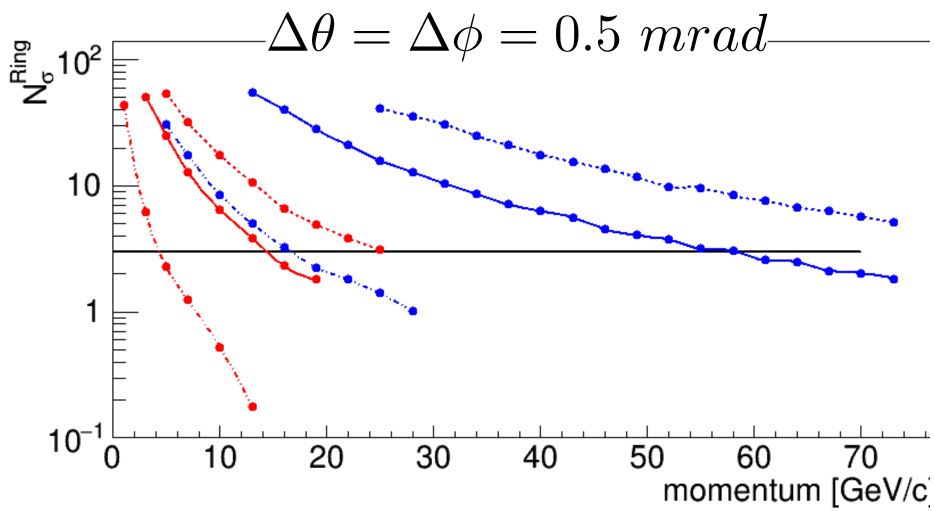


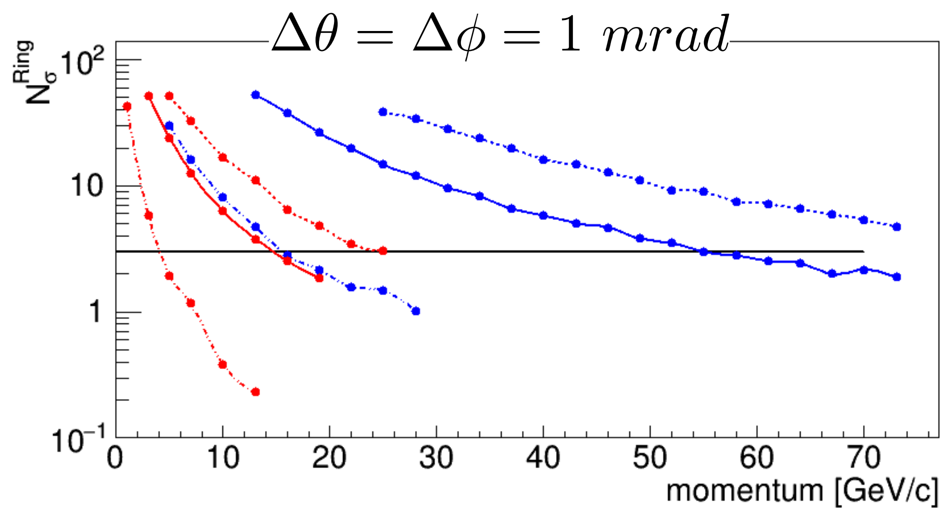
Traks generated in GEMC in this way, i.e. at 31 GeV/c : $p = < p > \pm \Delta p$
<option name="BEAM_P"   value="pi+, 31*GeV, 15*deg, 0*deg"/>
<option name="SPREAD_P" value="1.16*GeV,0*deg,180*deg"/>
<option name="SPREAD_P" value="3.48*GeV,0*deg,180*deg"/>

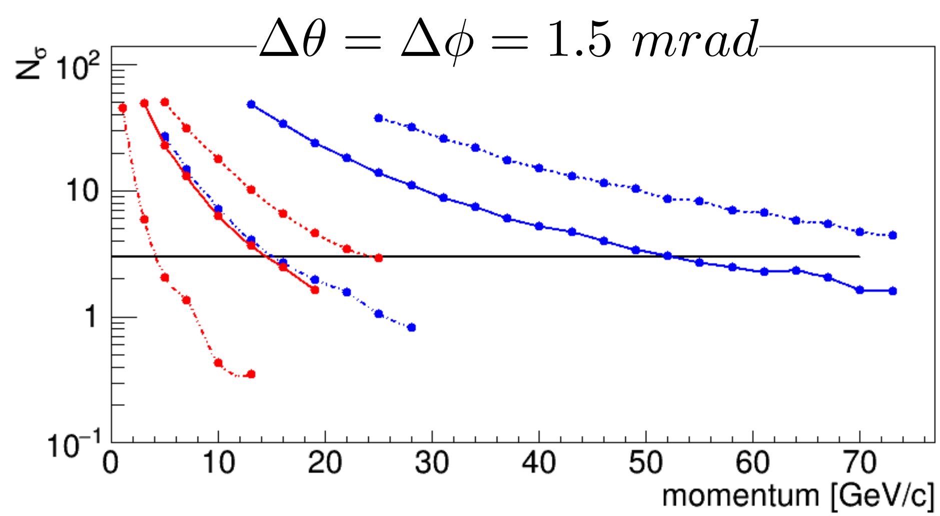
In addition an angular smearing has been added to the versor of the track entering the RICH, in both polar and azimuthal angle

$$\Delta\theta = \Delta\phi = 0.5, 1, 1.5\ mrad$$

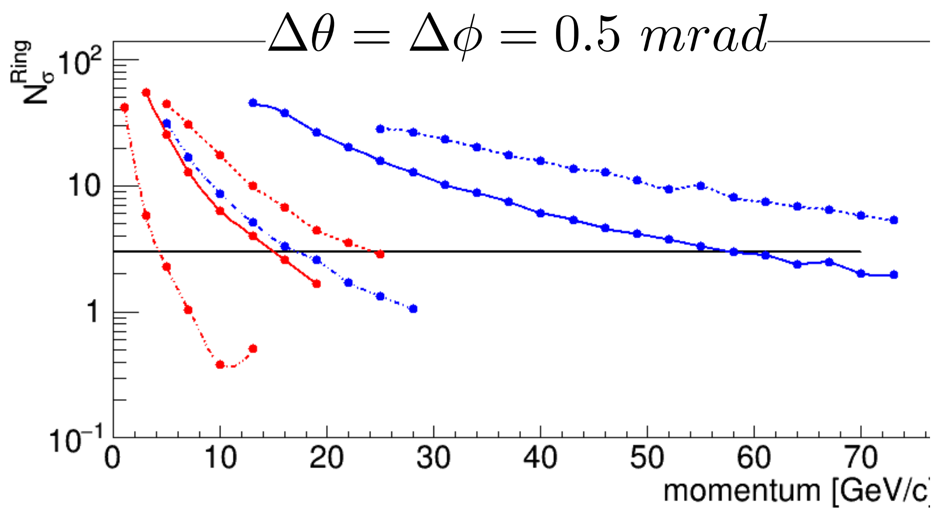
Performances at 15° (aerogel+C2F6) – Δp from red line

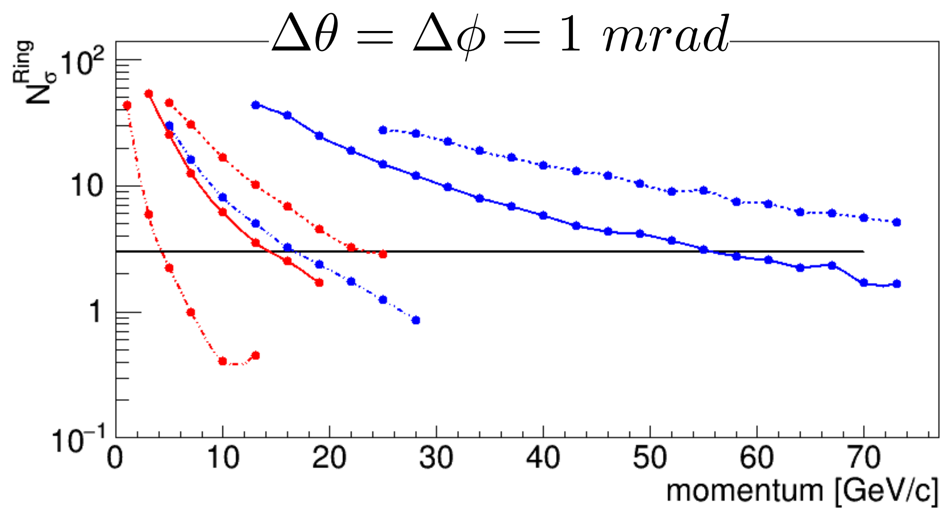


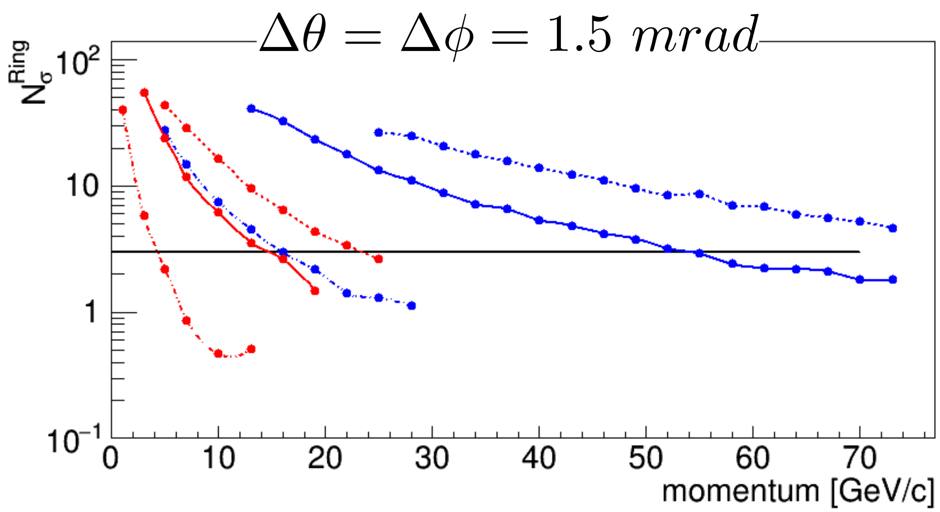




Performances at 15° (aerogel+C2F6) – Δp from blue line







Performances at 15° (aerogel+C2F6) – Δp from red line

	N_{σ}^{Ring}		
e/pi(gas):	3.23	16 (GeV)	
pi/k(aerogel):	3.89	13 (GeV)	
pi/k(gas):	3.29	55 (GeV)	
k/p(aerogel):	3.73	22 (GeV)	
k/p(gas):	4.99	73 (GeV)	(beyond 73 GeV under simulation)

$$\Delta\theta = \Delta\phi = 0.5\ mrad$$

e/pi(gas):	2.99	16 (GeV)	
pi/k(aerogel):	3.76	13 (GeV)	
pi/k(gas):	3.08	55 (GeV)	
k/p(aerogel):	3.37	22 (GeV)	
k/p(gas):	4.80	73 (GeV)	(beyond 73 GeV under simulation)

$$\Delta\theta = \Delta\phi = 1.\ mrad$$

e/pi(gas):	2.93	16 (GeV)	
pi/k(aerogel):	3.69	13 (GeV)	
pi/k(gas):	2.70	55 (GeV)	
k/p(aerogel):	3.40	22 (GeV)	
k/p(gas):	4.51	73 (GeV)	(beyond 73 GeV under simulation)

$$\Delta\theta = \Delta\phi = 1.5\ mrad$$

Performances at 15° (aerogel + C2F6) – Δp from blue line

	N_{σ}^{Ring}		
e/pi(gas):	3.36	16 (GeV)	
pi/k(aerogel):	3.78	13 (GeV)	
pi/k(gas):	3.11	55 (GeV)	
k/p(aerogel):	3.77	22 (GeV)	
k/p(gas):	5.07	73 (GeV)	(beyond 73 GeV under simulation)

$$\Delta\theta = \Delta\phi = 0.5\ mrad$$

e/pi(gas):	3.13	16 (GeV)	
pi/k(aerogel):	3.65	13 (GeV)	
pi/k(gas):	3.10	55 (GeV)	
k/p(aerogel):	3.43	22 (GeV)	
k/p(gas):	4.90	73 (GeV)	(beyond 73 GeV under simulation)

$$\Delta\theta = \Delta\phi = 1.\ mrad$$

e/pi(gas):	2.80	16 (GeV)	
pi/k(aerogel):	3.34	13 (GeV)	
pi/k(gas):	2.64	55 (GeV)	
k/p(aerogel):	3.31	22 (GeV)	
k/p(gas):	4.31	73 (GeV)	(beyond 73 GeV under simulation)

$$\Delta\theta = \Delta\phi = 1.5\ mrad$$

Comments

- The biggest effect seems to be from the angular uncertainty, at least at this level of Δp

Next steps:

- Enlarge the statistic, to avoid fluctuations
- Do the same for a third Δp larger than the blue curve
- Do the same for different polar angles