dRICh tentative porting of the geometry into ATHENA – episode 2

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People involved (past and present):

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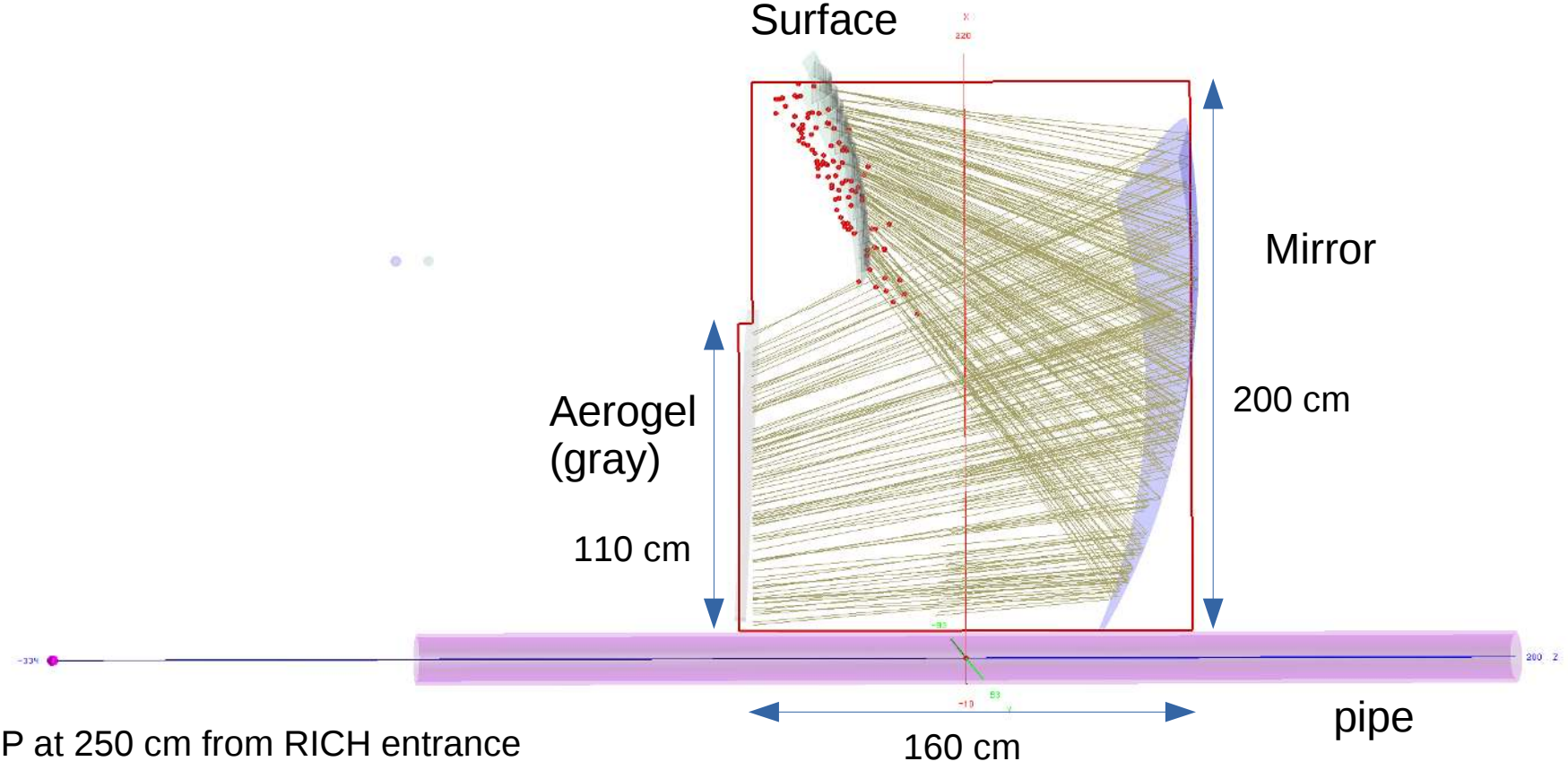
and the EIC-eRD14/PID Consortium

Original JLEIC dRICh (single sector)

red dots: focal region (approx.)
yellow lines: photons at gas Cherenkov angles relative to charger particles direction from IP

red line: JLEIC dRICh vessel profile



One of the first attempt to fit dRICh into ATHENA current constraints (single sector)

red dots: focal region (approx.)
yellow lines: photons at gas Cherenkov angles relative to charger particles direction from IP (they start after front vessel for coding simplicity)

red line: ATHENA vessel profile

very difficult (impossible?) to adapt the sensor surface to the focal region

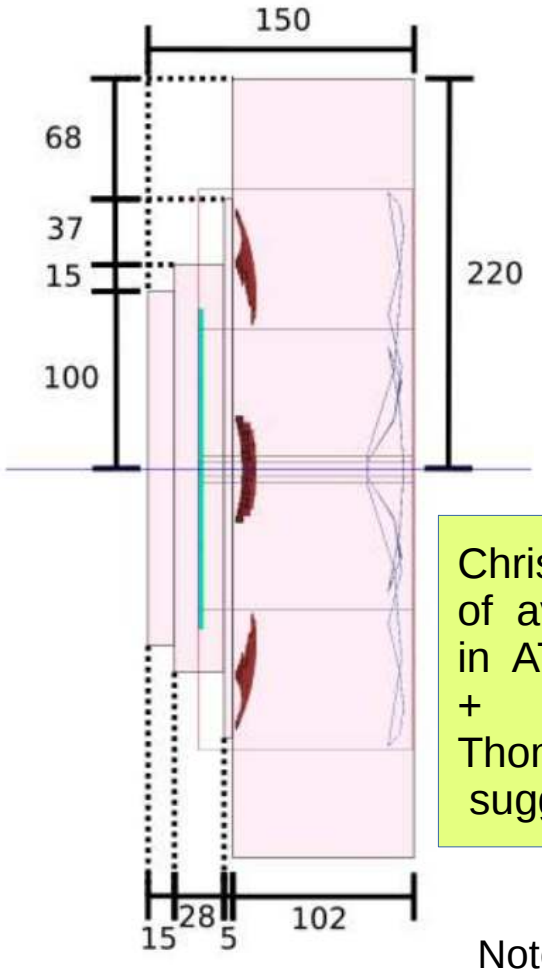
Dynamic RICH

X	0 cm
Y	0 cm
Z	0 cm
Aerogel Length	40 cm
Aerogel Radius	100 cm
Detector Length	110 cm
Bore Radius	10 cm
E1 Radius (Corner)	220 cm
E2 Radius (Corner)	125 cm
Offset from Center	-290 cm
Segment Count	6
Volume (Cylindrical)	12.139899 m³

IP at 200 cm from RICH entrance

New exercise based on “Chris-ATHENA”

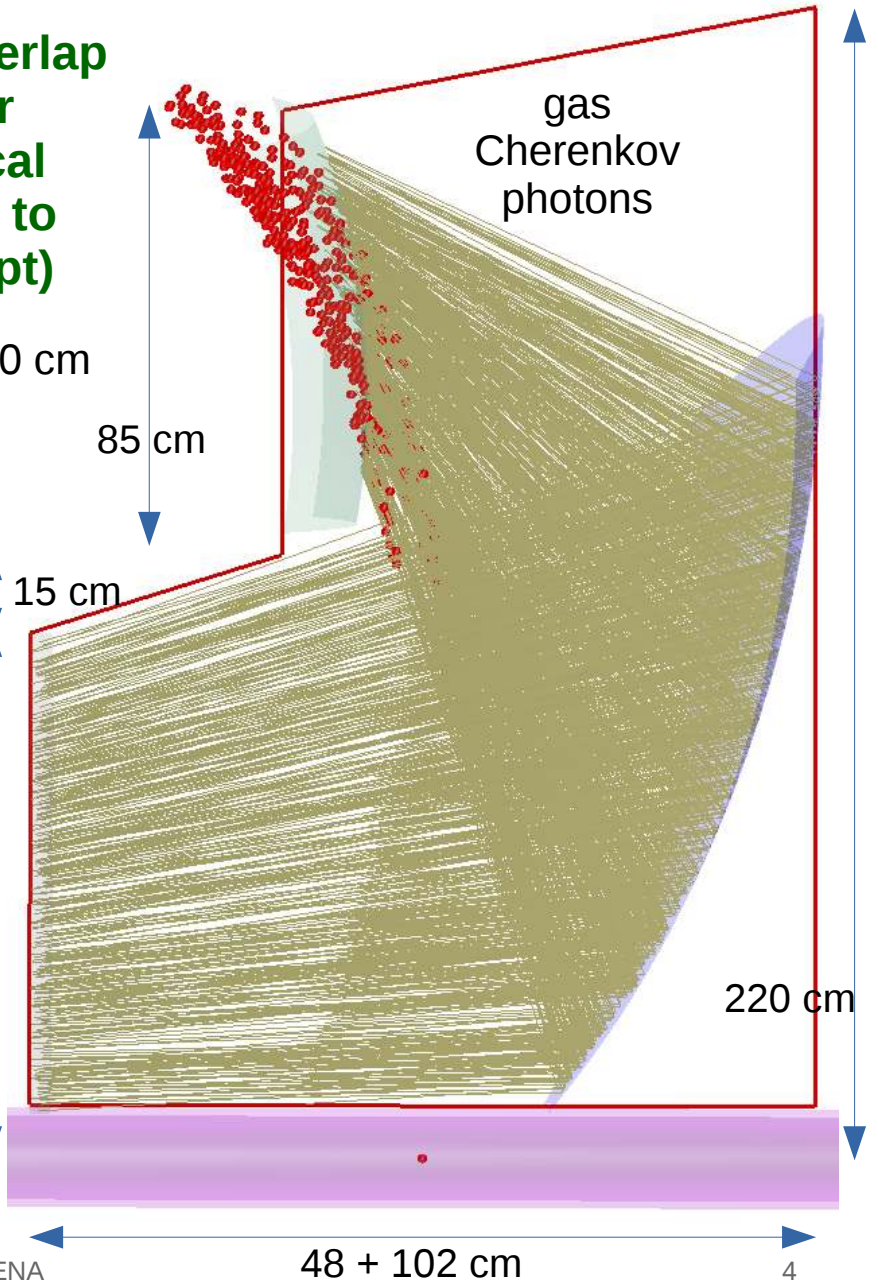
available dRICh space,
Menagerie 3T
DIRC LD readout



Much better overlap between sensor surface and focal region (respect to previous attempt)

mirror radius = 250 cm

Chris assumption of available space in ATHENA
+
Thom Hemmick suggestions

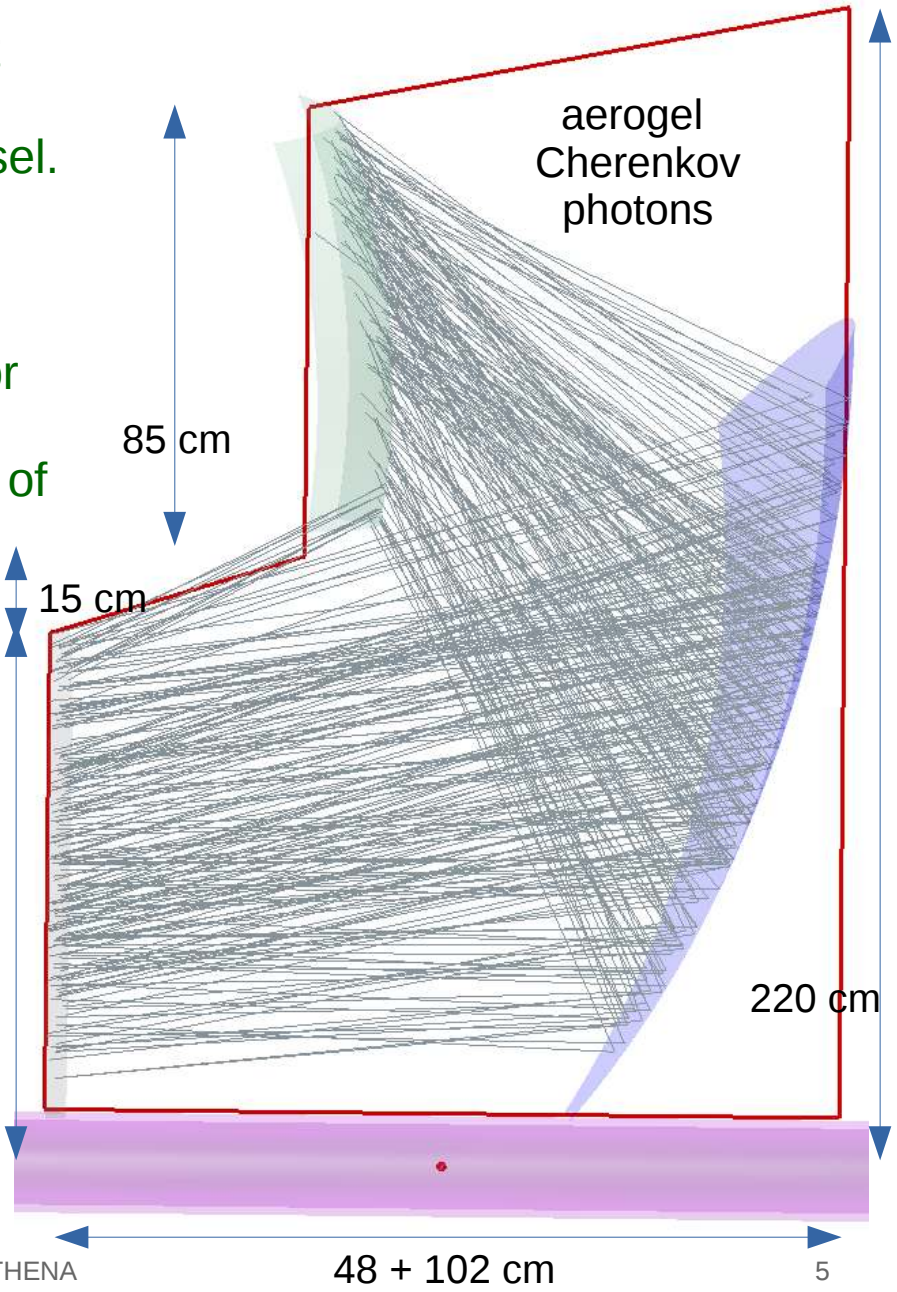


Note: IP is at 290 cm from entrance of the dRICH

“Chris-ATHENA” looks much more comfortable

There is much more margin of improvement (than previous geometry) thanks to the transverse available space, in the back vessel.
Possible directions:

- tune mirror radius, its rotation, the sensor position
- use double reflections scheme with sensor above mirror
- use segmented mirrors with different radii of curvature
- ...



Aerogel photons at large polar angles may hit the vessel walls

(at small polar angles aerogel photons are less reflected due to the limitation of the mirror in azimuthal direction)

Tilted aerogel

Tilted aerogel may solve the large polar angles reduced acceptance of photons

Gas path is approximately constant and about 100 cm (likely acceptable)