

# RICH Upgrade

Transversity needs:  $\pi : K$  rejection  $\sim 1:1000$  at 2.4 GeV/c

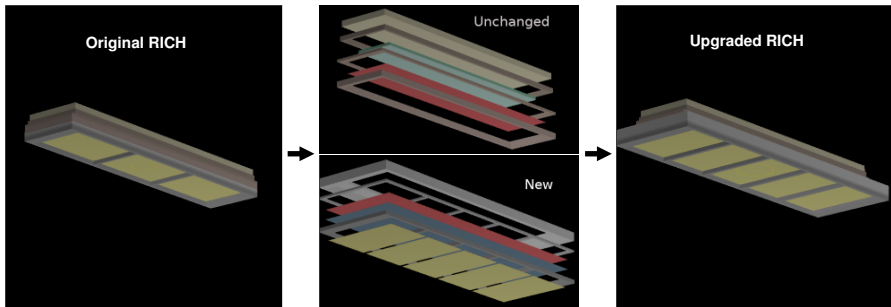
Original RICH at 2.4 GeV/c:  $\Delta\theta \sim 4.1\sigma \Rightarrow \pi : K \sim 1 : 140$

$\Rightarrow$  RICH upgrade required:

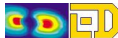
- ①
  - ✓ 60% larger photon detection area (more photons collected)
  - ✓ 75% longer proximity gap (smaller geometric error)
- ② The JLab RICH is a sandwich of:
  - ▶ 6 Al frames (3 preserved, 3 new - largest work)
  - ▶ a radiator (preserved)
  - ▶ 3 wire planes (one preserved)
  - ▶ pad panels (preserved + spare, rotated  $90^\circ$ )
- ③
  - ▶ Use original electronics + new version (available): 19200 total channels!
  - ▶ Finite Model and MonteCarlo Analyses (based on the real data of the original RICH) show very small mechanical deformation and achievement of the  $\pi:K$  rejection needs.



# Upgraded Proximity Focusing RICH @ JLab



Radiator	15 mm thick Liquid Freon ( $C_6F_{14}$ , $n=1.28$ )
Proximity Gap	100 → 175 mm, filled with Methane at STP
Photon converter	300 nm CsI film coated on Pad Planes
Position Detector	3 → 5 × pad planes = $(3 \times 645) \times 403$ → $(5 \times 403) \times 645$ mm <sup>2</sup>
Pad Plane	Multi Wire/Pad Proportional Chamber, HV = $1050 \div 1100$ V $403.2 \times 640$ mm <sup>2</sup> (single pad: $8.4 \times 8$ mm <sup>2</sup> )
FE Electronics	11520 → 19200 analog chs, multiplexed S&H



# Work in progress (the 3 frames almost ready)



Two frames ready to be assembled

Last frame under processing



# Upgrade Status

- ✓ Design (completed)
- ✓ Material Procurement (completed)
- ✓ Detailed drawing (completed)
- New Frames Manufacturing: almost completed, delivery expected before xMas (2 months behind the original schedule, due to the company delay - and milling cutter failures)
- ✗ Wire stretching/First assembling (on hold, expected to start after xMas)
- ✗ RICH Delivery to JLab (February)
- ✗ Pad Panel Evaporation (March-April, depending on detailed installation plan)
- ✗ Final Assembling at JLab (April-May, depending on detailed installation plan)
- ✗ Installation in Hall A (May-June, depending on detailed installation plan)

The RICH upgrade is still largely compatible with the latest Transversity installation plan.

