

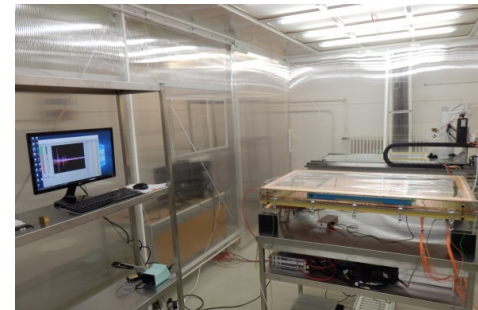
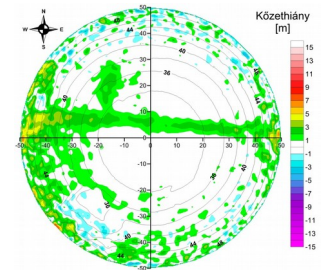
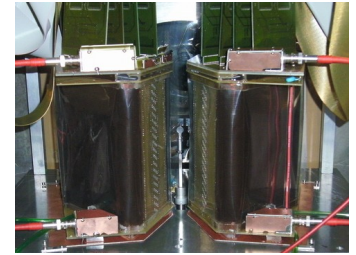
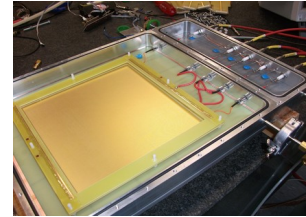
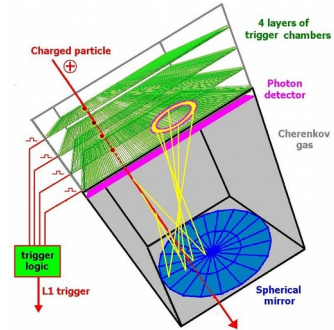
# MWPC / CCC option for MuonID

dezso.varga@cern.ch et al for Wigner RCP ALICE group,  
contributions from G. Bencédi, G. Barnaföldi, G. Hamar, etc.

- MWPC-s well understood for over five decades
- High efficiency, low cost (relative to scintillators or RPC-s) – reasonable time and position resolution
- Should tolerate modest B-field.
- **Gas:** non-flammable, non-greenhouse gas (unlike RPC-s): Argon+CO<sub>2</sub> mixture (typical flow 1 litre/hour for 1 m<sup>2</sup>). No aging
- **Rate capability:** Expected 0.1kHz/cm<sup>2</sup>, MWPC-s 100kHz/cm<sup>2</sup>
- High voltage conveniently below 1.7kV
- Available earlier experience (see next slide)

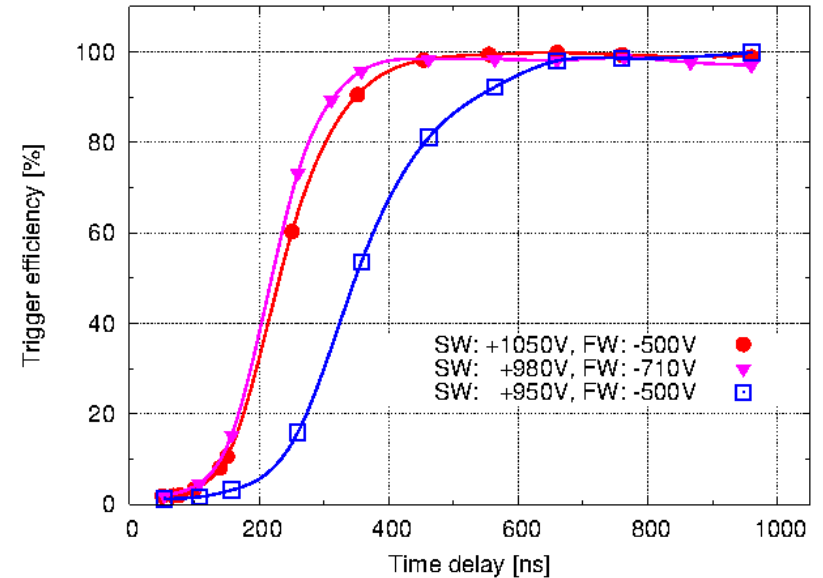
# Expertise and Capabilities at Wigner RCP

- ALICE VHMPID + HPTD :  
Tracking d. + Cherenkov d.
- ALICE GEM TPC :  
GEM QA, Uniformity scan
- NA61 LMPD :  
TPC for backscattering
- Muography : imaging hill-sized objects  
via measuring the absorption of  
cosmic muons
- Gaseous det. lab.,  
Clean room, Construction hall



# Option A: Close Cathode Chamber – available beam tests, results

- Easy construction, high (>99%) single layer efficiency. Time resolution <200ns FWHM
- Position resolution better than 5mm (if needed)
- Approx. 12kg single layer weight (per m<sup>2</sup>)



NIMA 698 (2013) 11.

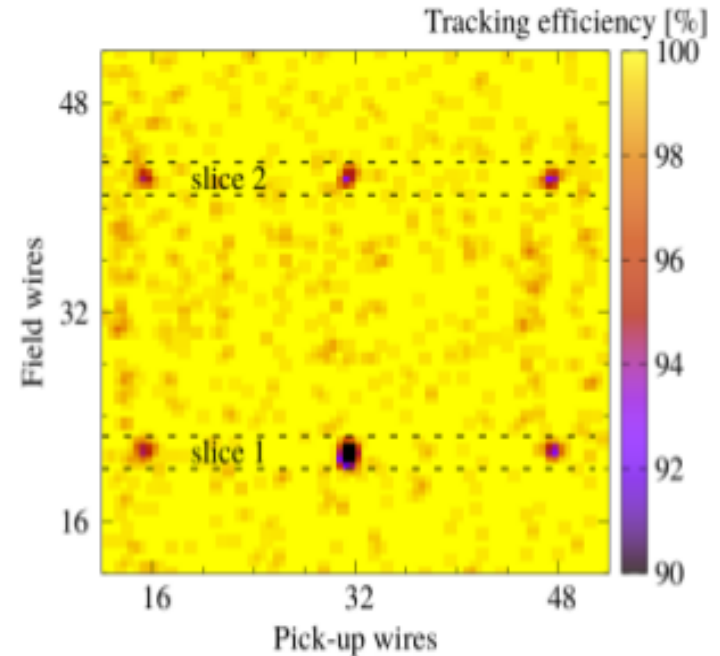
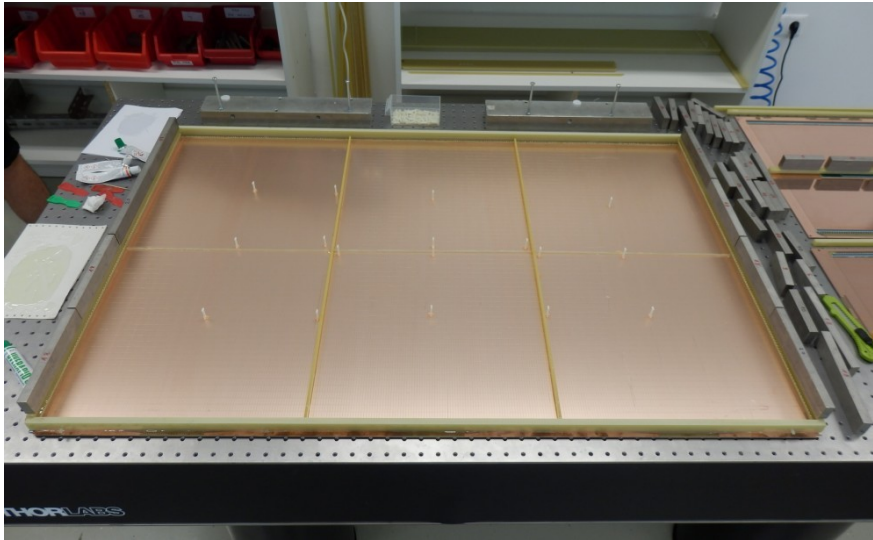
NIMA 639 (2011) 274.

NIMA 648 (2011) 163

Nucl.Phys. Proc. Supp. 197 (2009) 296

# Option B: Standard MWPC-s: robust option

- If conditions favour conventional MWPC-s, technology from cosmic muon imaging
- More than 120 m<sup>2</sup> produced by now. 12 mm segmentation in 2D. Weight 15kg /m<sup>2</sup>



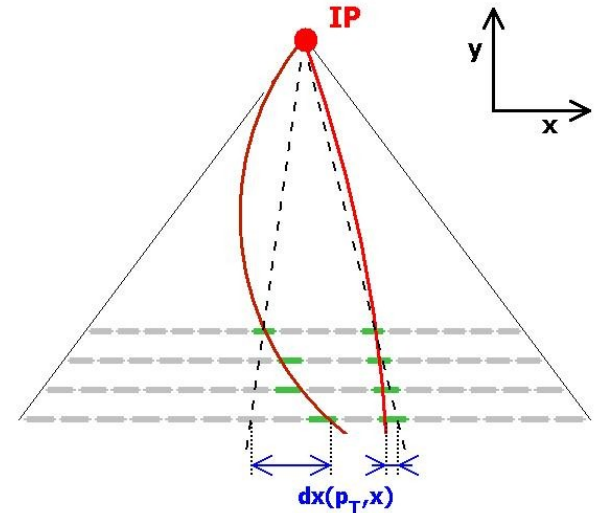
Eur. J. Phys. **36** 065006 (2015)

arXiv:1607.08494, AHEP

Scientific Reports, Volume 8, Article number: 3207 (2018)

# Practical realization of MuonID

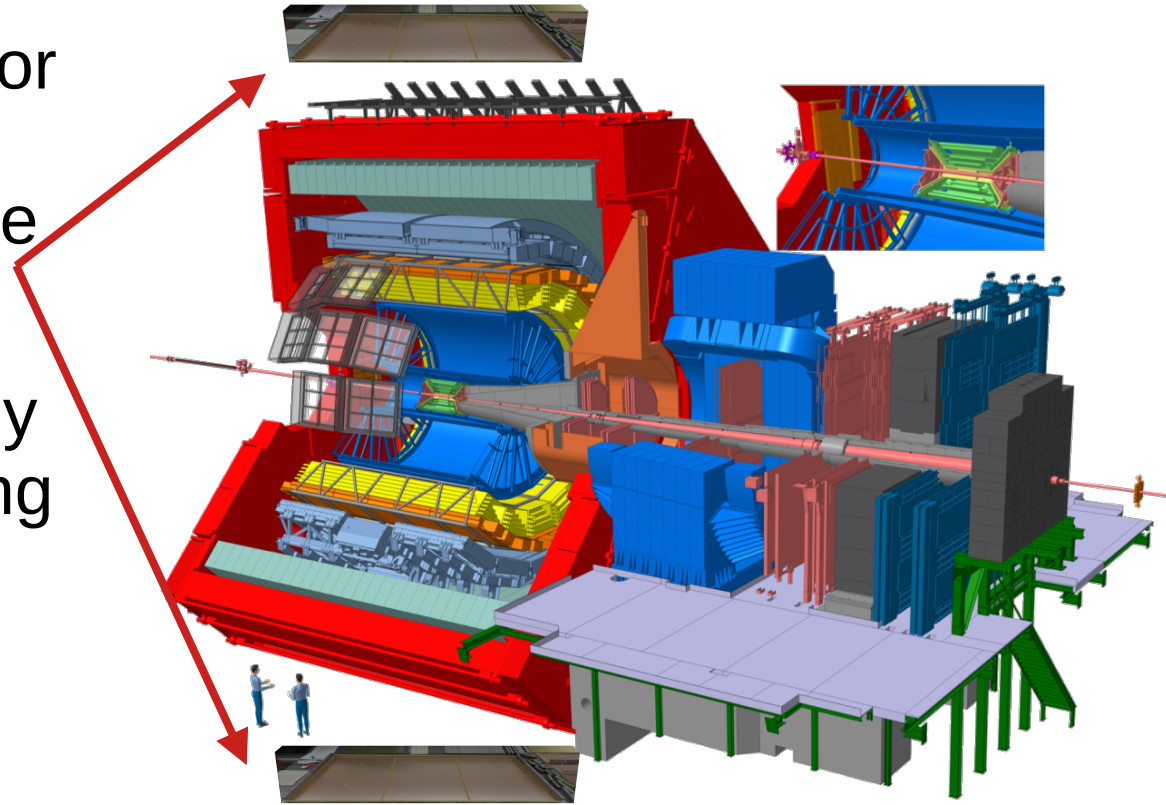
- Total net area 180 m<sup>2</sup>: may be 4 layers with MWPC (720m<sup>2</sup> total detector area)
- Multiple layers and 1cm position resolution enables “tracklet” pattern recognition – suppression of leaking hadron showers
- Simple and low cost electronics allows high number of channels (144k ?)
- Suggestion for testing: test chambers within the present ALICE environment, at an analogous position!



Low vs. high  $p_T$

# Proposal for a pilot live study

- Placing few layers MWPC or CCC modules, 50 – 80 cm size above and/or under the ALICE magnet
- Measure the hit rate (mostly muons), and test data taking & triggering.
- In parallel → simulations



# A) CCC vs B) MWPC

1 m <sup>2</sup>	MWPC	CCC
Weight	15kg	12kg
Position Resolution	12 mm	< 5 mm
Time resolution:	<400 ns	<200 ns
Power	5W/module	5W/module
Gas: Ar-CO <sub>2</sub>	1 l/h	1 l/h

# Backup

- Rate capability
- No observed ageing for non-CH-based quencher

