

*DPG 2018*

*V. Patel*

*Overview*

*Setup for  
COSY beam  
test*

*Test results*

# *Beam test results for the new DIRICH readout chain for MAPMTs and MCPs*

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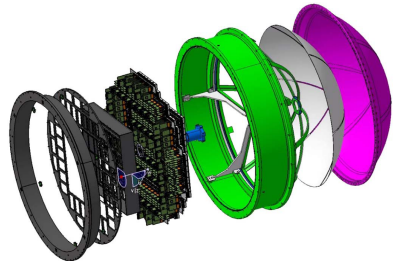
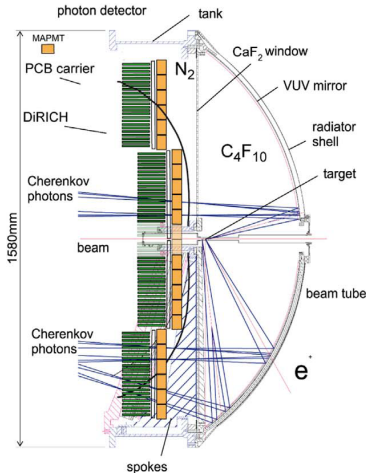
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## Exploded sketch of upgraded HADES-RICH



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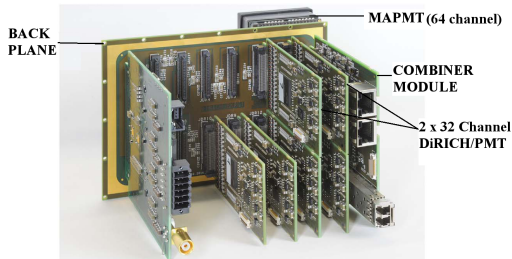
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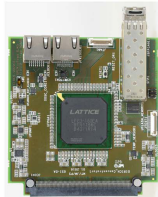
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## Readout electronics for 3 x 2 MAPMT modules



**DiRICH frontend  
module**



**Combiner module**



**Power module**

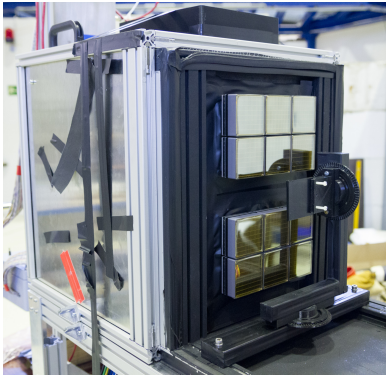
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- Cherenkov prototype detector for COSY beam test in Nov 2017
- Two fully equipped 3x2 module, 12 MAPMTs, glass/quartz radiator.
- 6 of which were coated with wavelength shifting coating for testing UV efficiency.

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There were many parameters tested during this beam test.

- Main motive was to check the DiRICH concept in real beam conditions.
  - In particular hit multiplicity.
  - Noise behaviour in MAPMT and readout electronics.
  - Ring sharpness.
  - Single photon detection efficiency.
  - Expected time precision from electronics. (HK21.4 - Time resolution of the DiRICH MAPMT readout with and without WLS coverage by Adrian Amatus Weber)
- To check the gain in photons due to wavelength shifting coating on MAPMTs.

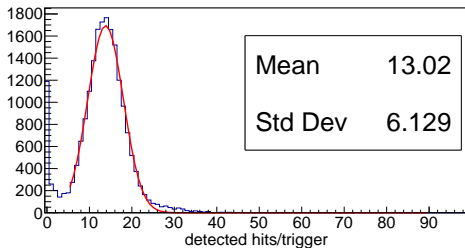
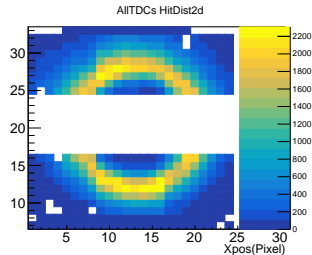
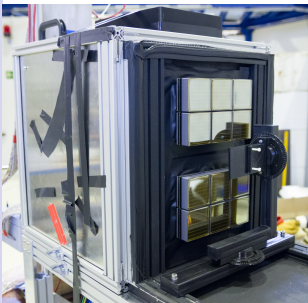
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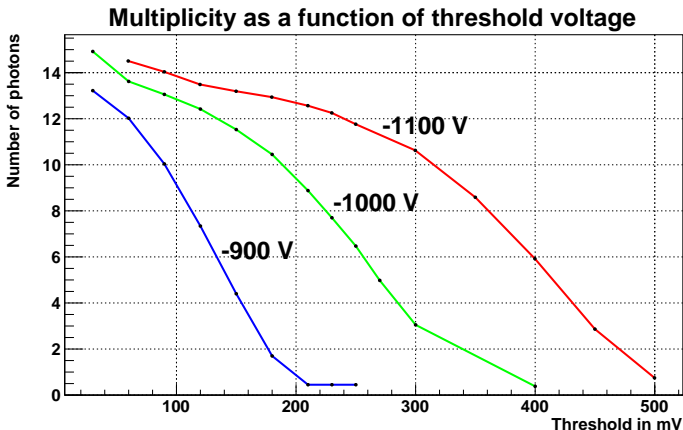
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Simulation : Expect 16 photons with measured quantum efficiency and 100% collection efficiency.

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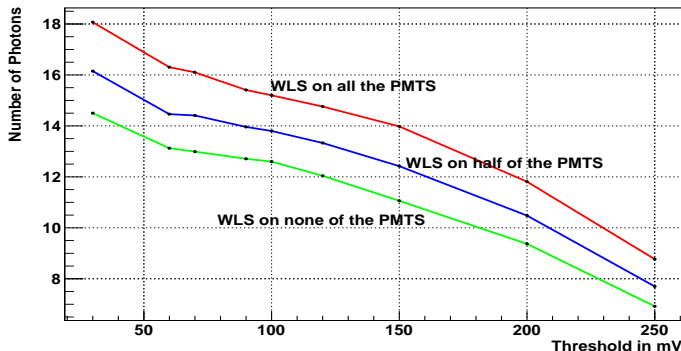
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## Hit Multiplicity for different combinations of WLS coating





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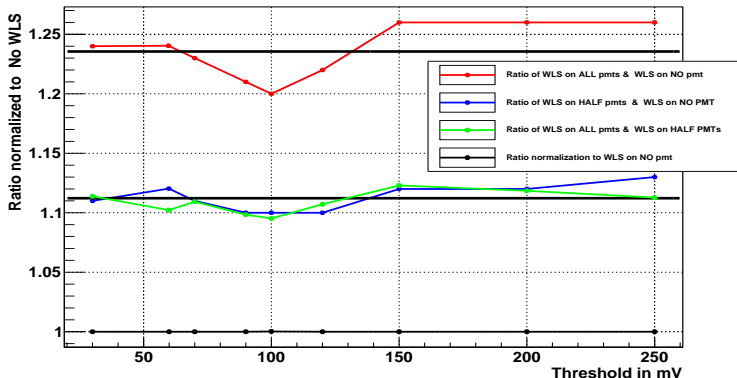
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## Hit Multiplicity ratios for different combinations of WLS coating



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- Beam test at COSY was successful.
- Initial results shows that concept of DiRICH will work.
- WLS coating increases the Multiplicity  $\sim 23\%$
- Plan is to equip inner part of HADES-RICH with WLS coated MAPMTs. Upgraded HADES-RICH will see its first beam in last quater of 2018 at SIS 18, GSI.
- Mass production of DiRICH has already began. It is expected that the delivery will start in March-April 2018.