

# A Shower Tracking Calorimeter for PANDA

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# Outline

- 1 Calorimeter Concept
- 2 Realisation
- 3 Summary

## Requirements

### Electromagnetic Calorimetry

- Problem: shower leakage
- Add HCAL energy

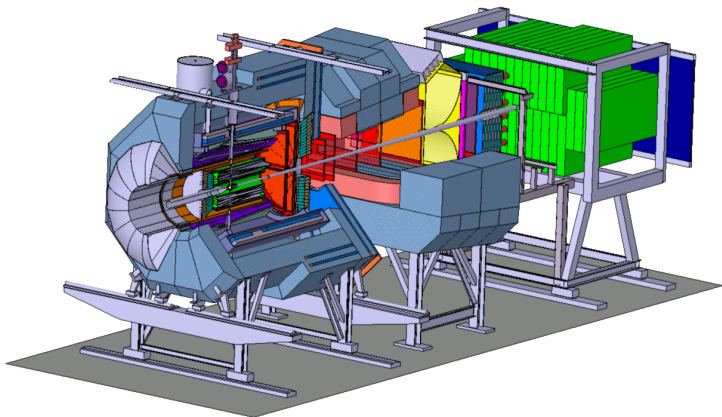
### Hadronic Calorimetry

- Problem: e/h separation
- Use shower depth for separation

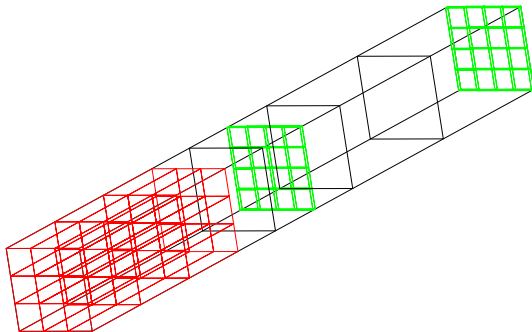
### Muon Detector

- Problem: Full calorimeter is too much absorber
- Insertion of muon detector
- Not possible in normal calorimeter

# PANDA



## An STC Module



Shashlik EMC

Muon Hodoscope

Segmented HCAL

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## Realisation

### Basic Building Blocks

- Front part: Shashlik type ECAL,  $6.6 \times 6.6 \text{ cm}^2$  (close to Moliere radius of 5.8 cm)
- Back part: Refurbished MIRAC material, maybe Shashlik HCAL,  $20 \times 20 \text{ cm}^2$
- Scintillator Hodoscope with  $5 \times 5 \text{ cm}^2$  tiles

### Segmented Light Collection

- Front part: longitudinal segmentation by cladding fibres at 3 different depths and collection on separate PM channels
- Intersection: ECAL fibres are collected on the side with a steel fibre guide (already part of HCAL absorber)
- Back part: Light collection either by WLS around scintillators or again Shashlik type collection (probably less fibres needed)
- Muon part: Individual WLS fibres for tiles

## Readout

### Readout channels

- The segmentation gives 64 cells:
  - $2 \times 16$  channels for muon hodoscope
  - $3 \times 9$  channels for ECAL part
  - 5 channels for HCAL part

### Photon detectors

- 64 channels per module
  - Use 4 16-channel MAPMTs (maybe with thinner WLS fibres)
    - Ideal candidates: MAPMTs from HERA-B RICH (1000 pieces)
  - Still reserved for COMPASS!
  - Alternative: 64-channel MAPMT or MCP



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## Summary

### Advantages

- Tailored muon detection
- Good e/h separation
- Compact overall design
- Detector synergy

### Next steps

- Discuss detector concept
- Find interested group(s)
- Clarify situation with HERA-B PMTs  
(plan budget with and without)
- Build prototype module