Frontend electronics
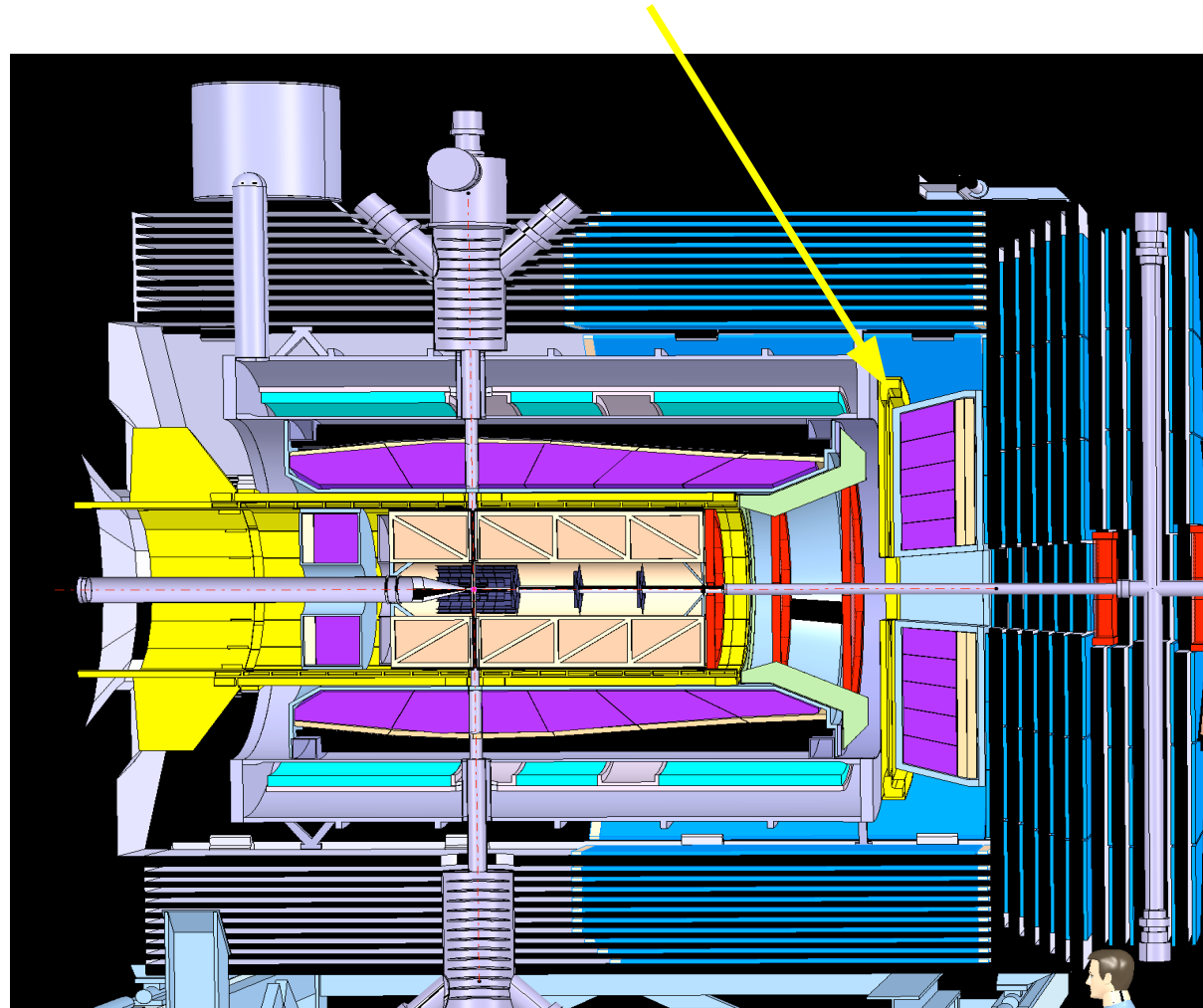for the
# Focussing Disc DIRC

- Detector setup
- Constraints
- Requirements
- Possible Solutions
- Outlook

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Detector Setup

- Disc
  - Fused Silica (SiO2) Suprasil 311
  - 4+2 pieces
  - Radius 1100mm
  - Thickness 20mm
- LiF-Crystal Block
  - Dispersion correction
  - $50 \times 50 \times 20 mm^3$
- Focussing Lightguide
  - Focussing Cherenkov angles to focal points
- Converter
  - 128 MCP-PMT Burle 85011
  - $50 \times 50 mm^2$
  - 15mm Thickness
  - 1x32Channels
  - 4096 channels total
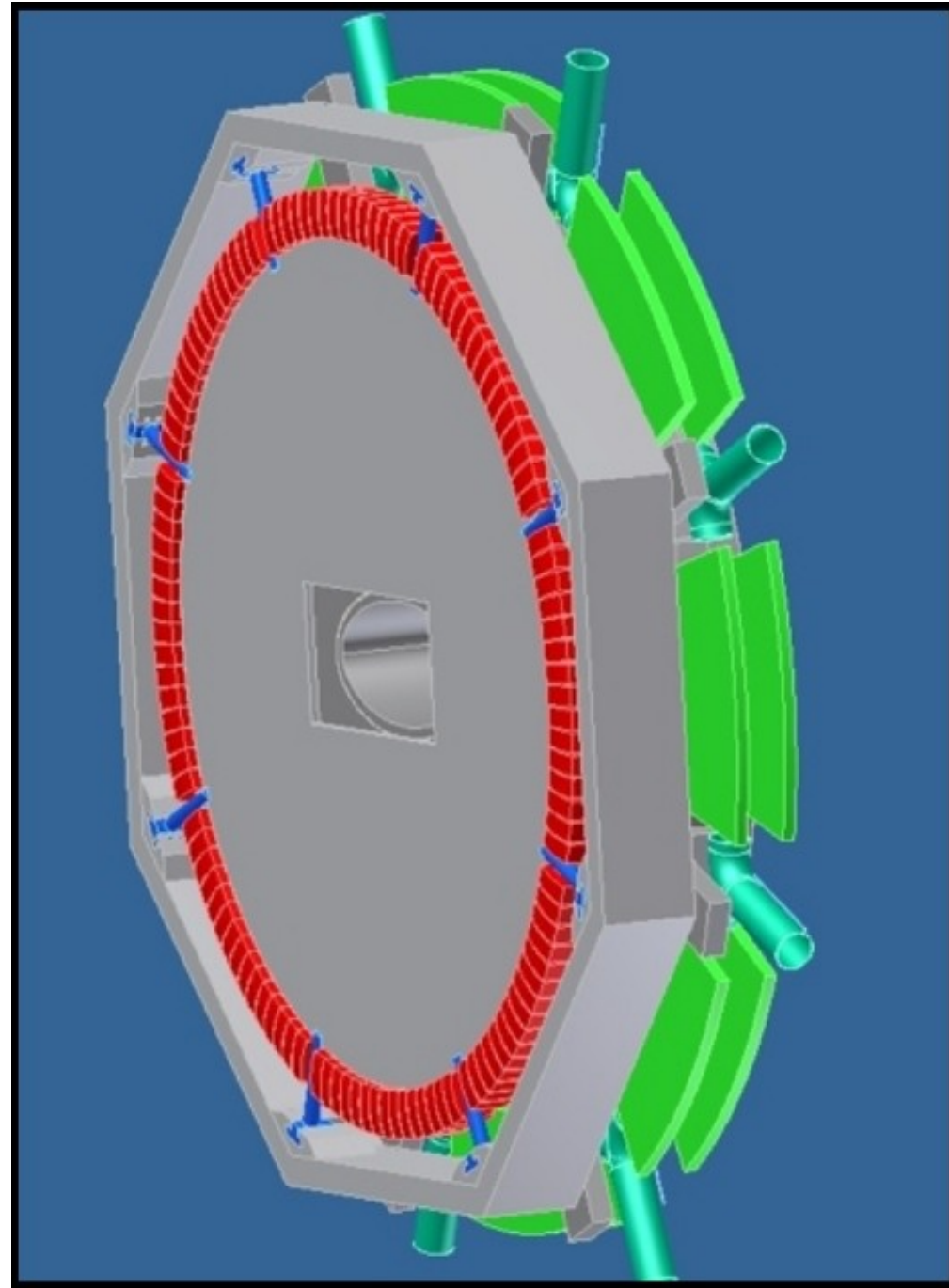
Contraints

- Geometrical constraints

  - 1202mm = 128 MCP-PMT with 59mm as inner radius

  - 17mm = 52mm/tan(70deg) to minimize Mag. Field impact

  - 15mm = thickness MCP-PMT Burle 85011

  - 75mm = holding frame size

  - 1325mm = outermost radius

  - Yields to ~15mm space for electronics behind MCP-PMT

- Electrical constraints

  - ~3KV for the MCP-PMT

  - Rise/Fall time of PMT signals ~few ns

  - Timing resolution ~few 100ps should be fine

  - ~4k channels by 128MCP-PMT with 32Channels

  - 4 times 8channel Connector with 2mm pin-distance

Requirements

- Rough data assumptions

  - 20M intersections per seconds

  - 7 : Multiplicity in average

  - 30 : Number of generated Photons

  - 128 MCP-PMT

  - yields

    - ~33M hits per MCP-PMT
    - ~1M per MPC-PMT-channel
    - 7Bytes per hit
      - 2 for location
      - 3 time stamping
      - 1 for status
      - 1 spare
    - ~230MBytes per second per MCP-PMT
    - ~2.5GBit per second per MCP-PMT
    - Background NOT included yet

Ad hoc possible readout system

- Selfmade ASICS

  - FEE with full digitization; data available for download

  - Costs, man power, knowledge, complexity, time

  - Crosslinked MCP-PMT for noise hit suppression

- ASICS from market adapted

  - More or less same like above

- Discriminator with TDC-chip

  - Digitizing on FEE

  - Filtering with "standard" equipment out side detector

- PreAmplifier

  - FEE only for Signal/Noise-Improvements and transmitter

  - Digitizing/filtering with stock-hardware out side detector

Outlook

- DAQ and Trigger Workshop

  - Collect remaining constraints

    – Collect further physical constraints (multiplicity;#Photons;....)

    – Time stamping interface

    – Trigger contribution

    – Available Hardware space inside detector

    – Location of hardware / distributed readout

  - Compile a list of possible solutions

  - Collect requirements for the interfacing and monitoring

- Any other requests