DE LA RECHERCHE À L'INDUSTRIE

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Cylindrical MicroMegas services

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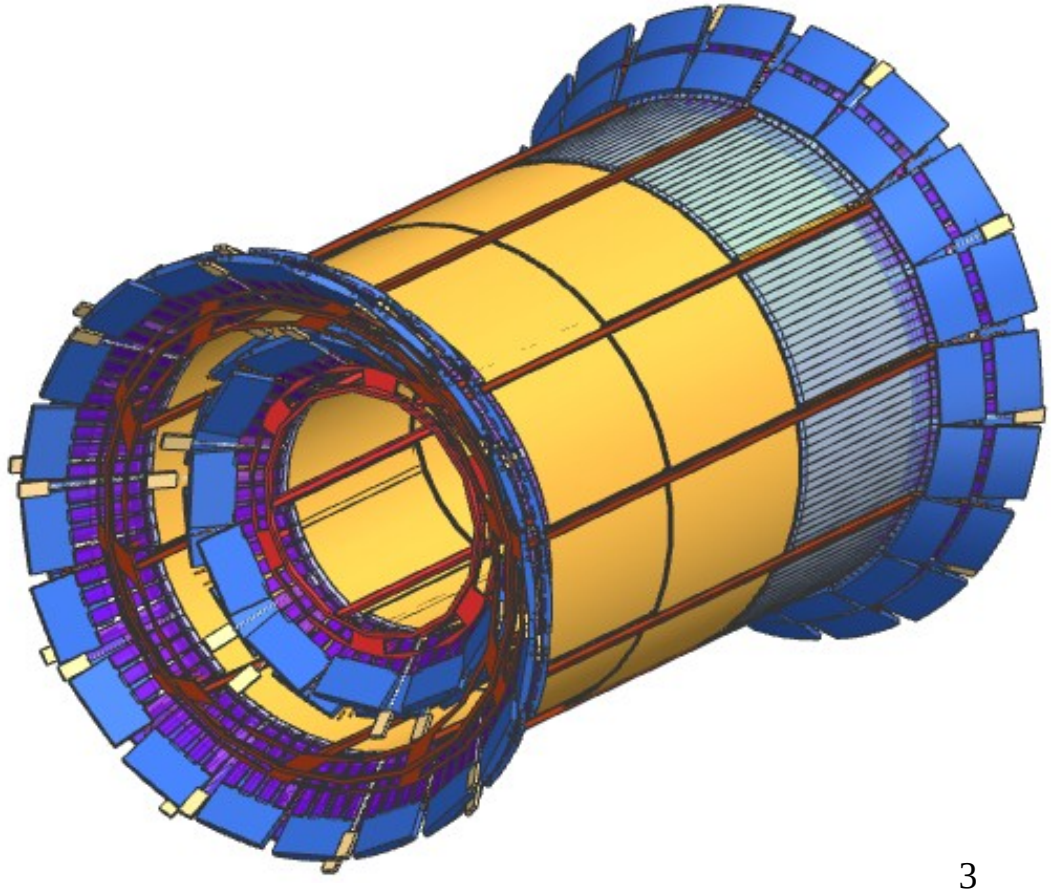
Introduction

- The ePIC MPGD configuration is not defined yet
- We can give services per module
- How many modules depends on
  - The number of MPGD layers
  - The radii of the layers
- The amount of front-end cards also depends on the readout pitch
- The readout pitch depends on the requirements for tracking/pattern recognition
- So, in the following, estimates based on the work done during the ATHENA's proposal

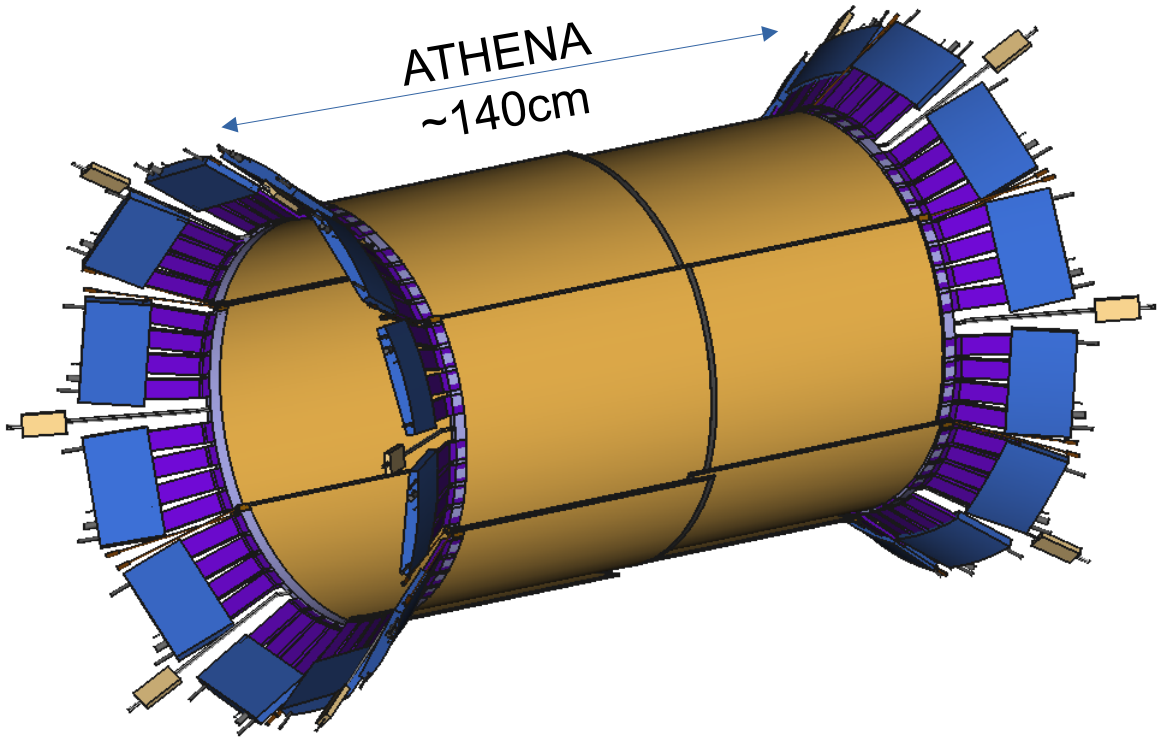
ATHENA's design

- Just a reminder
- 4 layers, ~100 modules
- Inner radii ~50cm
- Outer radii ~75cm
- Length: η ±1.1



In ePIC

- Radius similar to the ATHENA inner layers (~50cm)
- But longer, ~2m
- About 7 tiles in phi
- Either 3 modules in z
- Or 2 modules, 1m long



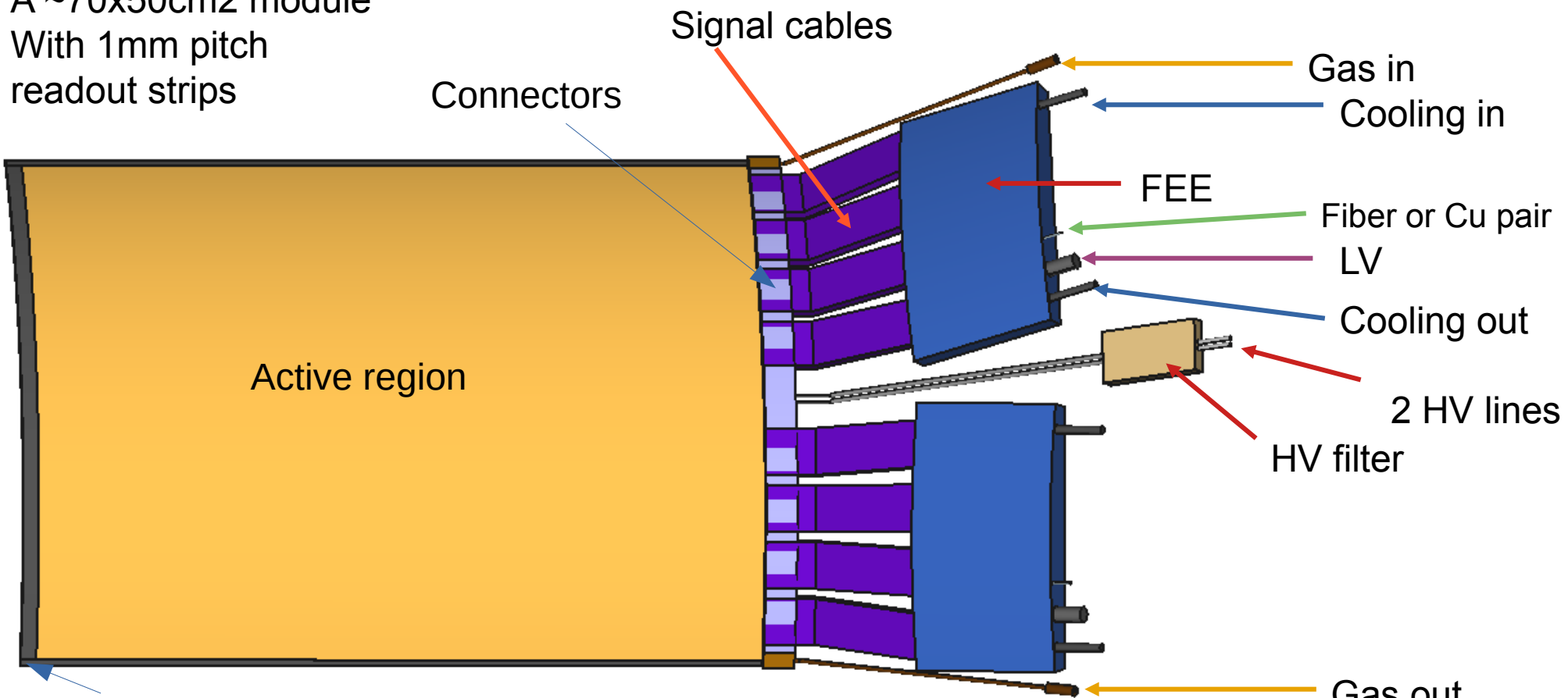
Services per module

- HV cables: 2. 1 for the cathode, 1 (or more) for the anode
- Gas: in and out pipes (modules in series can share the same piping)
- Electronics:
  - based on a new ASIC: Salsa (Saclay, Sao Paolo, eRD109)
  - ~1024 channels/module (assuming 1 mm pitch or bigger)
  - ~2 FEE boards
  - Each FEE:
    - LV
    - Cooling

One optical fiber or copper twin pairs: see here for more
https://indico.bnl.gov/event/16272/contributions/65247/attachments/41716/69879/220623_Mpgd_FeAlter_IM.pdf

A MicroMegas Tile

A ~70x50cm2 module
With 1mm pitch
readout strips



Remarks – I

- High density cables can be used reduce the routing, with patch panels close to the layers
- Gas: we can consider to have three tiles in series to reduce the piping. Patch panels inside the magnet?
- LV. DC-DC converters to reduce the size of the cables
- Concentrator boards. Depending on the needs of the DAQ

Remarks – II

- Estimates based on old requirements.
- These must be updated once we define the MPGD layers
- Requirements for momentum resolution or just for pattern recognition are different
- How to answer these questions:
  - We need simulations with background
  - We need to implement strip readout in simulation