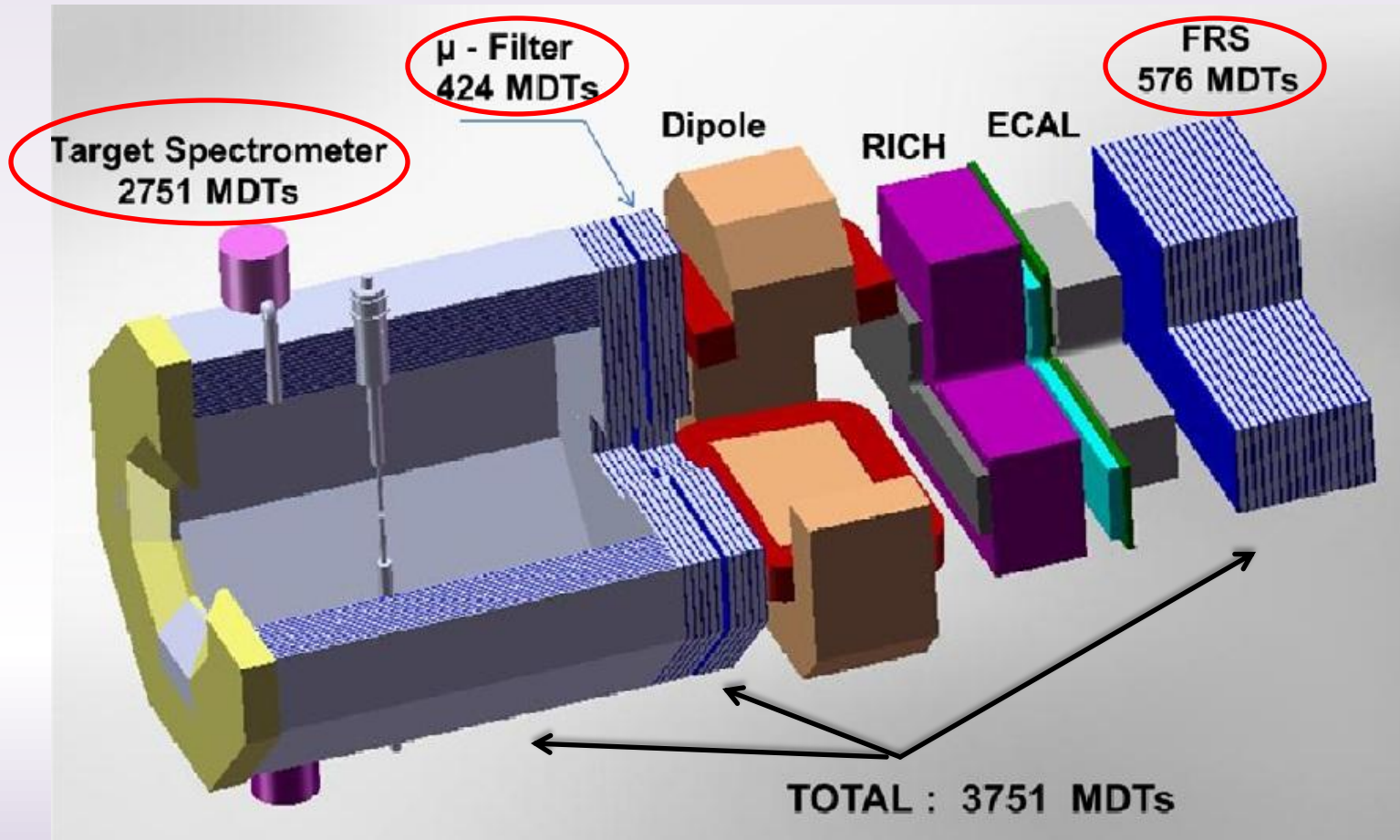


# Muon System at PANDA

FAIR/PANDA/Technical Design Report of the Muon System



*Target Spectrometer:*

Barrel (B) + Endcap (EC)

FRS: Forward Range System

*Muon-Filter (MF)*

*FRS: Forward Range System*

MDT's: Mini Drift Tubes

# Muon System (MS) at PANDA

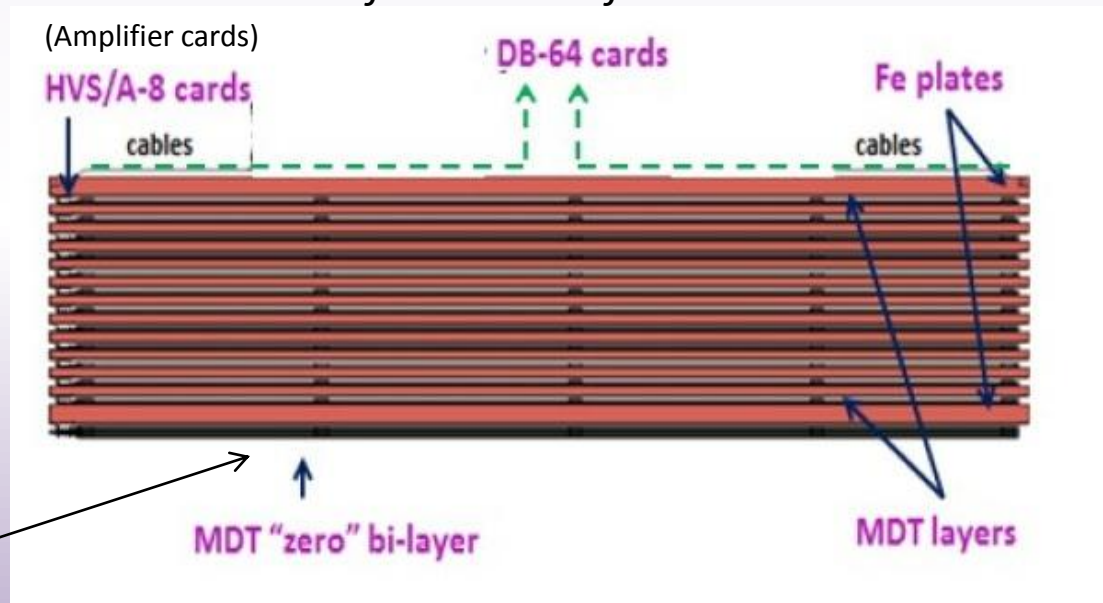
- **Main task of MS:** Muon identification and matching to the track segment inside the magnets
- **Range System Technique:** Sample of *detection layers* (Mini Drift Tubes and Strip Boards) and *absorber layers* (Iron) used in 4 different parts of the MS: Barrel, Endcap, Muon Filter and Forward Range System.
- **Detection layers** = MDTs + fiberglass strip boards, positioned inside the equal slots of 3 cm in iron absorber

Inner and outer plates have 6 cm thickness

Zero bi-layers = Multicoordinate system for starting coordinates of the particle tracks (2 MDT's + SB)

- **Readout** of signals from wires / stripes and amplification, afterwards feeding into digital cards (e.g. DB-64)

**Fiberglass Strip Boards:** 1 cm wide strips scratched into copper metalized surface of the fiberglass plate, running orthogonal to the direction of the wires of the MDT's



Typical Barrel module

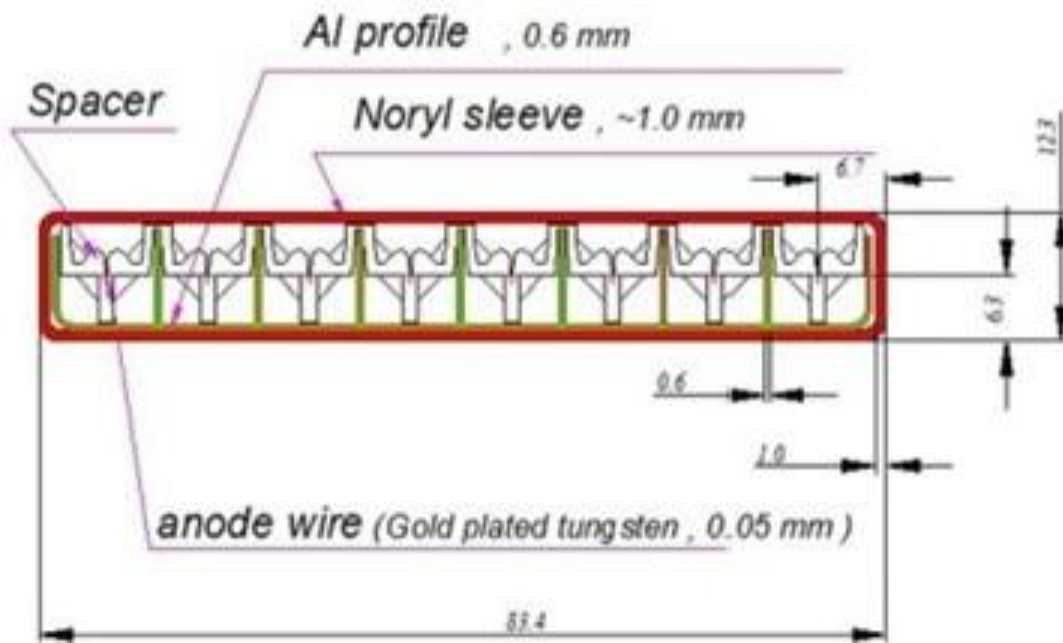
# Muon System at PANDA

## Detector layers: Mini Drift Tubes & Strip Boards

### **MDT's: Development of Iarocci Tubes (*streamer tubes*):**

- Same geometry as streamer tubes but used in proportional operational mode
- Metallic cathode, comb-like aluminum profile
- Anode wires 0.05 mm (gold plated tungsten)
- Plastic envelope for gas tightness (NORYL)

### *MDT cross-section*



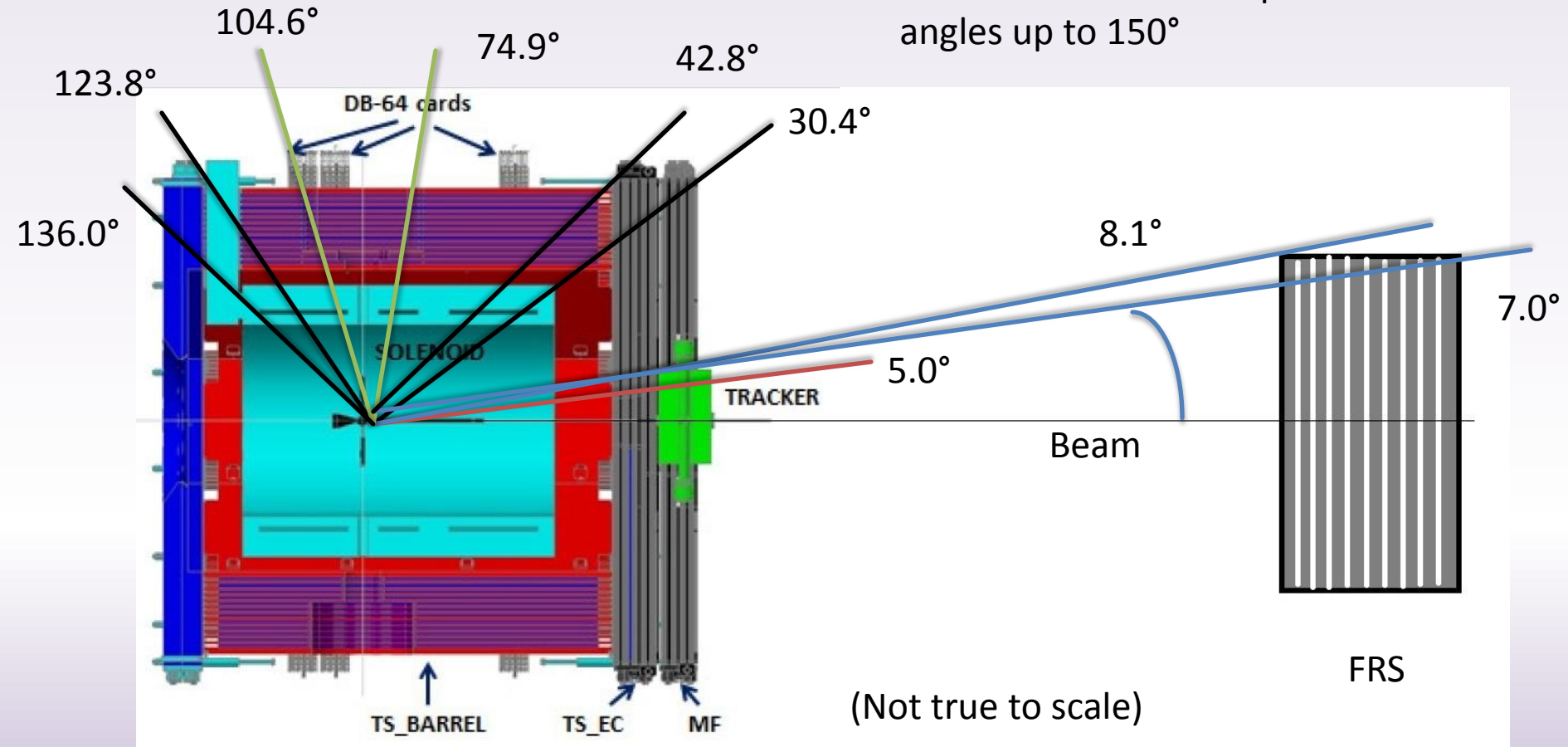
**Features:** Good time resolution, simplicity and flexibility of design for complex surfaces, robustness and small ageing



one-coordinate detector only.

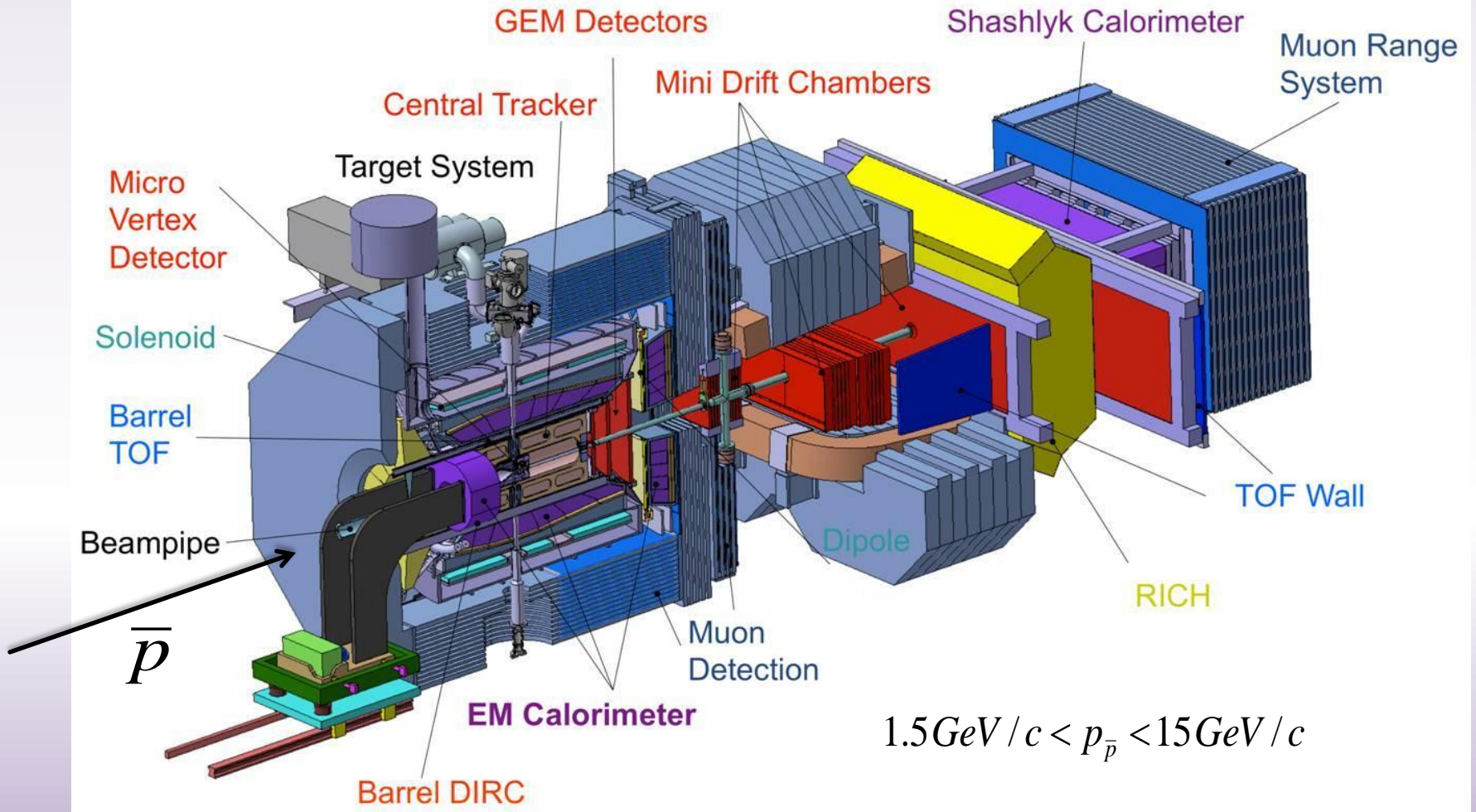
# Angular coverage of the MS

Muons are emitted at production angles up to  $150^\circ$



- Angles have been measured via selection tool using the 3D-model (.pdf) of the Panda-Detector
- Opening angle of the FRS beam gap :  $0.8^\circ$  (not shown in sketch)

# PANDA



**Table 3.1** Basic numbers for Muon System instrumentation

	MDTs	wires	strips	% of resources
Barrel	2133	17064	49916	61.2
End Cap	618	4944	8911	14.9
Muon Filter	424	3392	6876	10.7
Forward Range System	576	4608	7128	13.2
<b>Total</b>	<b>3751</b>	<b>30008</b>	<b>72831</b>	<b>100</b>