

# Tracking hyperons with PANDA

Michael Papenbrock

Uppsala University  
for the PANDA collaboration

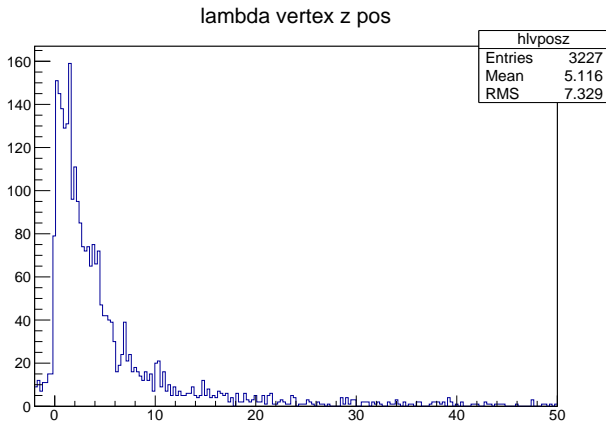
PANDA collaboration meeting  
Hyperon session  
December 9th, 2014  
Jülich, Germany



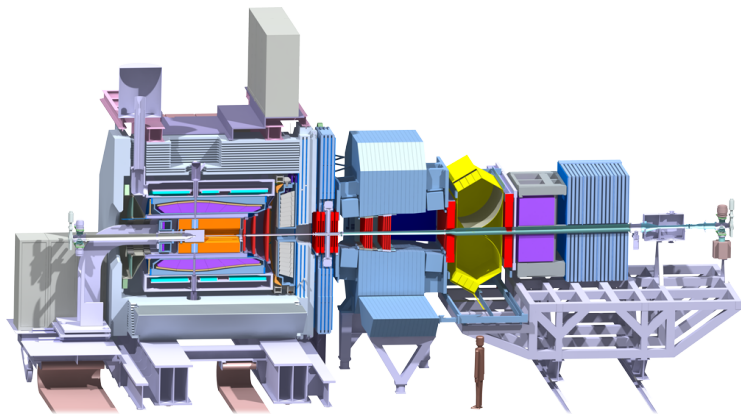
# What makes hyperons so special?

(in this particular case)

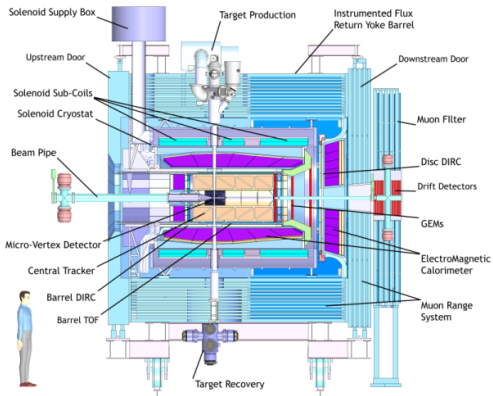
- Weak decay  $\Lambda \rightarrow p + \pi^-$  ( $\approx 64\%$ )
- ⇒ Decay vertex displaced from  $\bar{p}p$  interaction point



# PANDA



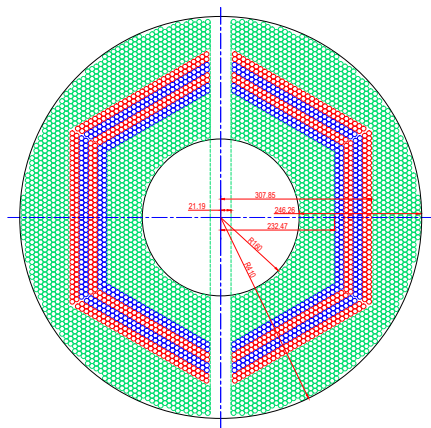
# PANDA Target Spectrometer



## (charged) track reconstruction

- STT (Straw Tube Tracker)
- MVD (Micro Vertex Detector)
- GEMs (Gas Electron Multiplier)
- SciTil / Barrel TOF (Scintillator Tile Hodoscope)

Let's focus on the STT for now



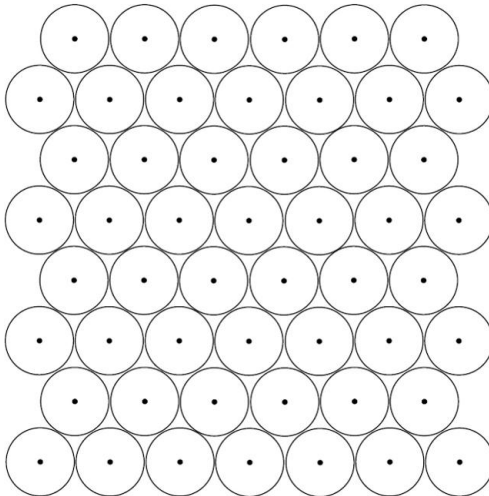
## STT Layout

- Green: parallel to beam axis
- Blue: skewed by  $+2.9^\circ$
- Red: skewed by  $-2.9^\circ$

# 1. TrackletGenerator

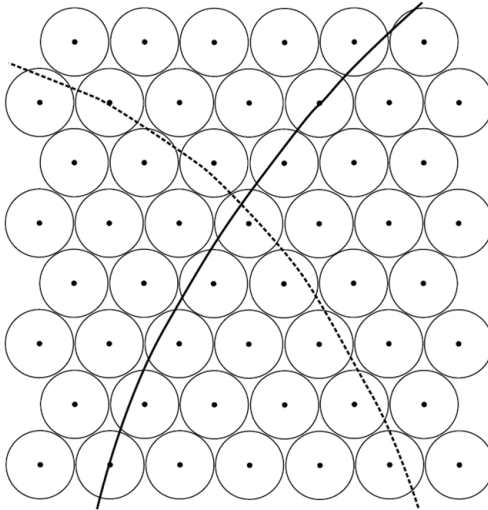
## Cellular Automaton - Apply to STT

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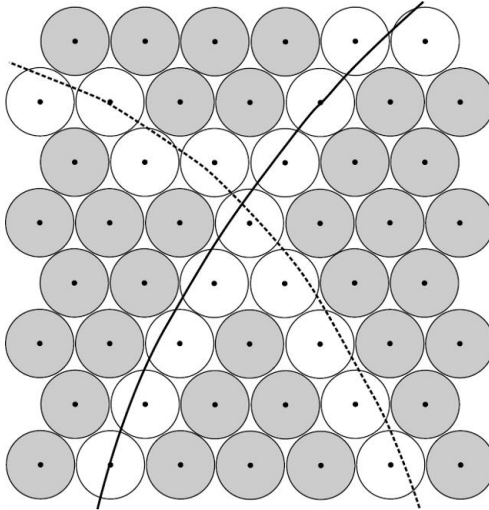
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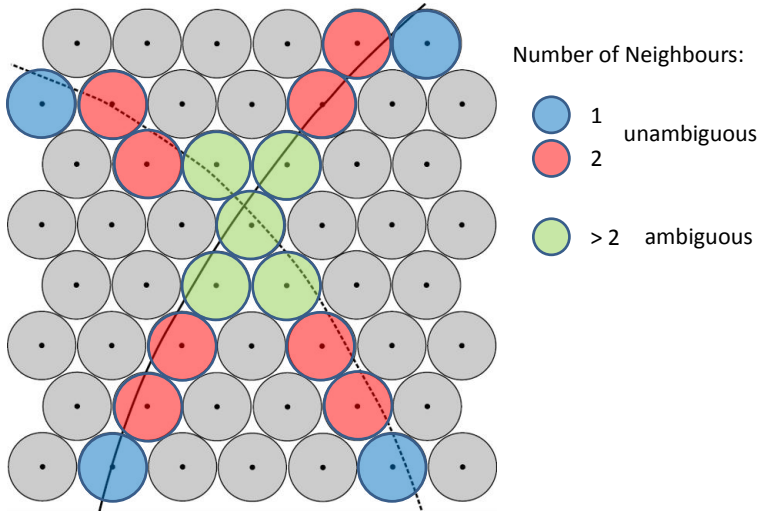
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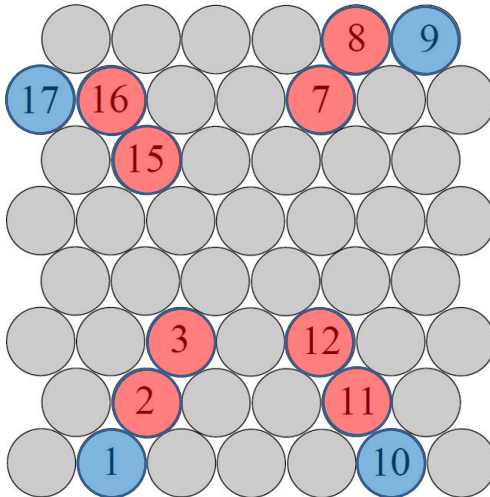
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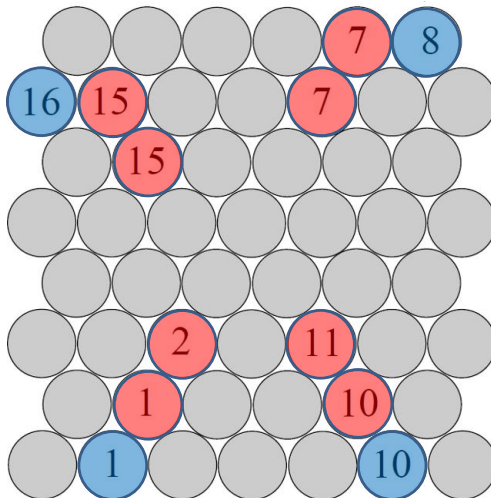


**Cell:** Straw with hit and one or two neighbours

**Rule:** Compare your status with the status of your neighbours and take the smallest one

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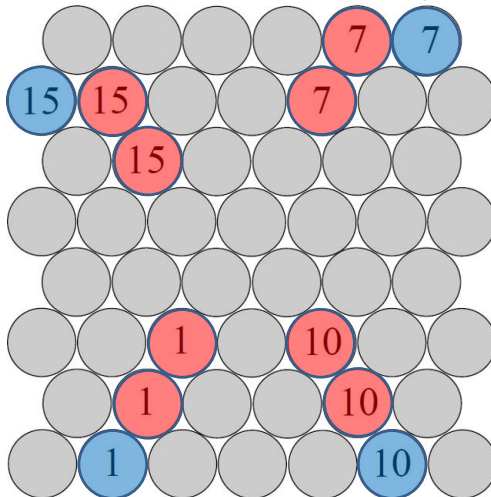


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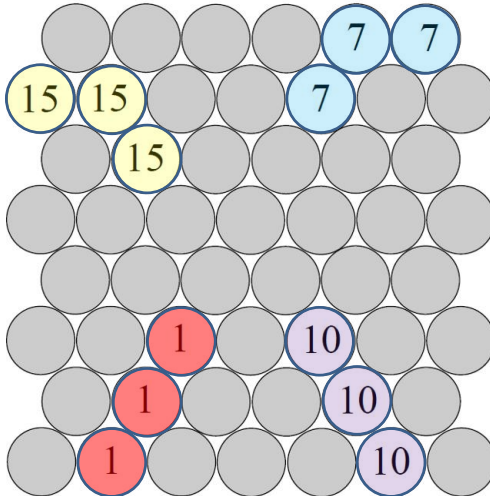


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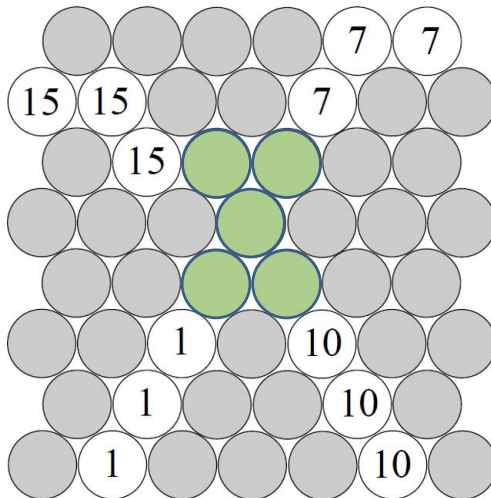


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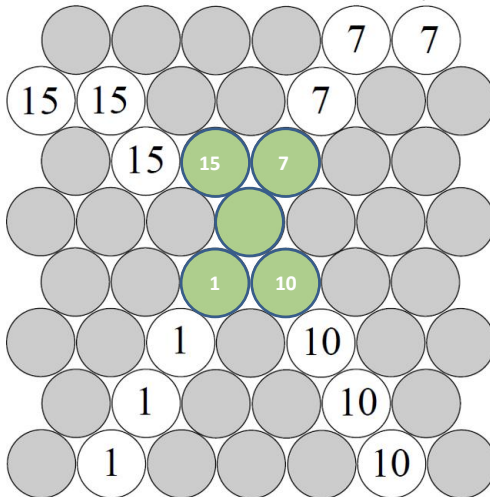


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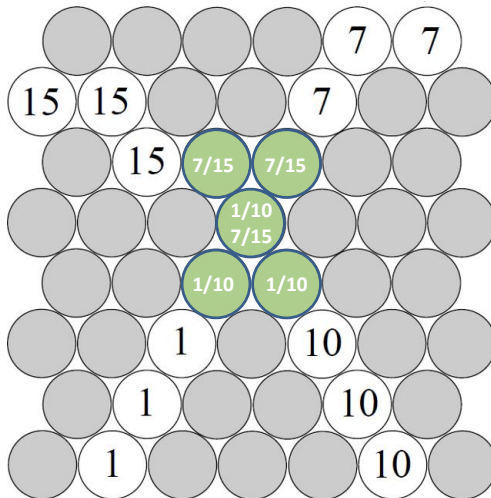


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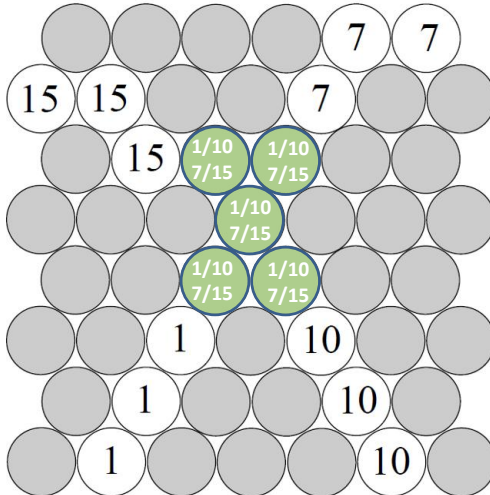
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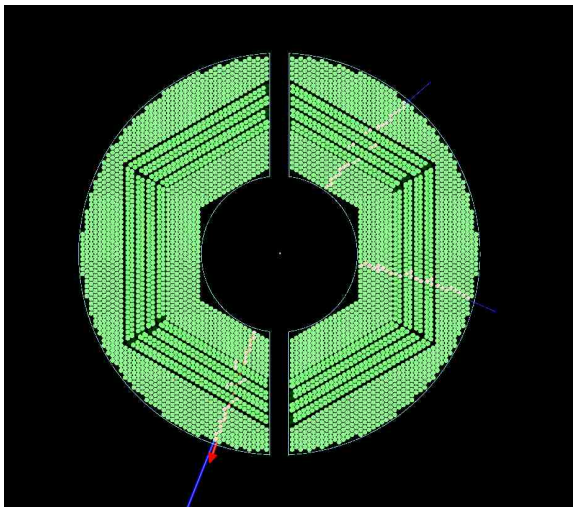
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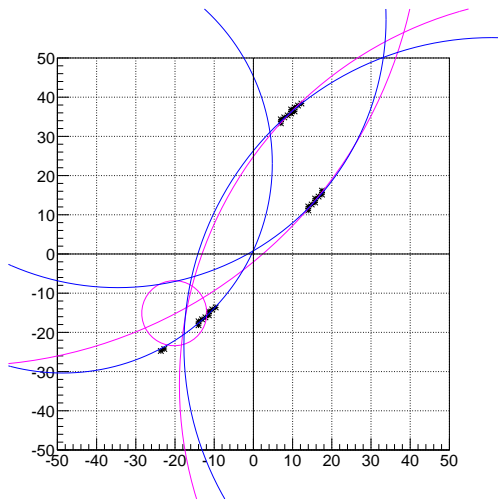
## Fitting

- Tracks in the x-y plane are basically circles (neglecting energy loss and small angle scattering for now!)
  - Use existing PandaRoot classes for Riemann circle fits
  - Use Riemann fits for combining tracklets
  - Riemann fit needs at least 3 points
- No assumption made about vertex position

So, how does it look like?

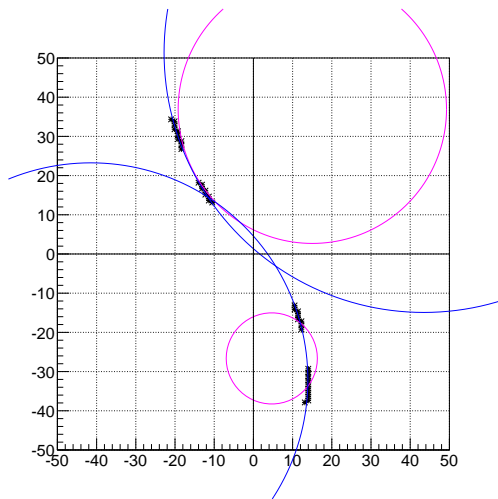


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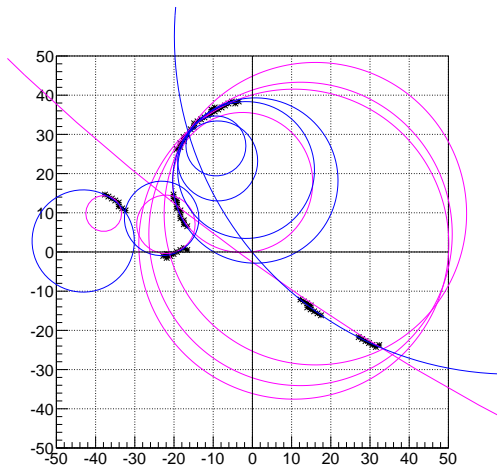
- Crosses: Center positions of hit straw tubes
- Magenta: Riemann fits to these hits
- Blue: Fits to “corrected” hits (from isochrones)

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So, how does it look like?



- Kinetically unreasonable tracks (e.g. vertices in same quadrant, energy loss not considered, etc.)
- Will probably improve with additional signals from skewed tubes and also MVD / SciTil

## Current status

- Only (parallel) STT hits are considered
  - Still some “unphysical” tracks
- ⇒ Investigate tracklet combination

### What's next?

- Add skewed hits
  - Add MVD hits
- Use Riemann trajectory and maybe also SciTil time information for this?
- Make use of physical / kinematical constraints?

## Further down the road

- Many tracks go to the forwards spectrometer
- This has to be considered for hyperon reconstruction!
- Do same methods apply for the forwards part?
- Combine efforts with FTS group?



The End

Thank you for your attention!

