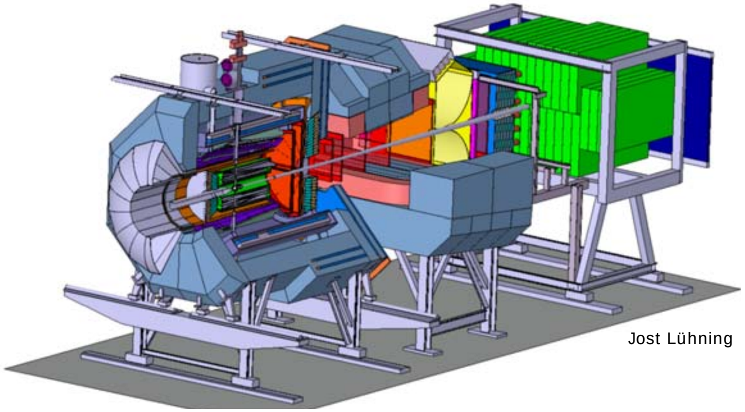
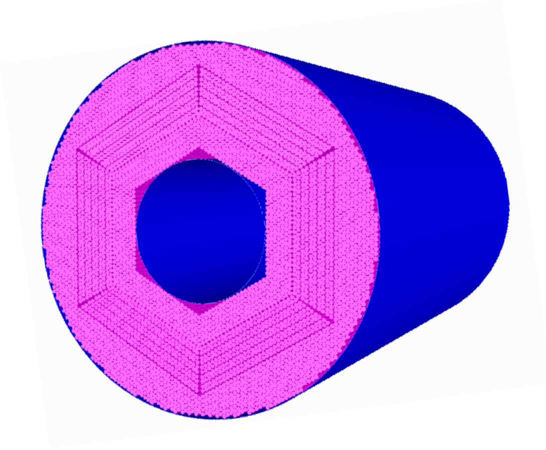

Jost Lühning



STT requirement and simulations

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STT Requirements

- **Acceptance**

  Almost 4π

- **Resolving complex events**

  Multiple tracks, secondary vert.

- **Spatial resolution**

  $\sigma_{r\varphi} \sim 150\mu m$ $\sigma_z \sim$ few mm

- **Momentum resolution**

  $\delta dp/p \sim 1.5\%$

- **Minimal Material budget**

  $X/X_0 \sim 1\%$

- **High rate capability**

  $3 \cdot 10^4$ ev cm^{-2} s^{-1}

- **Radiation hardness**

  0.1 – 1 C cm^{-1} y^{-1}

- **Allowed radial space**

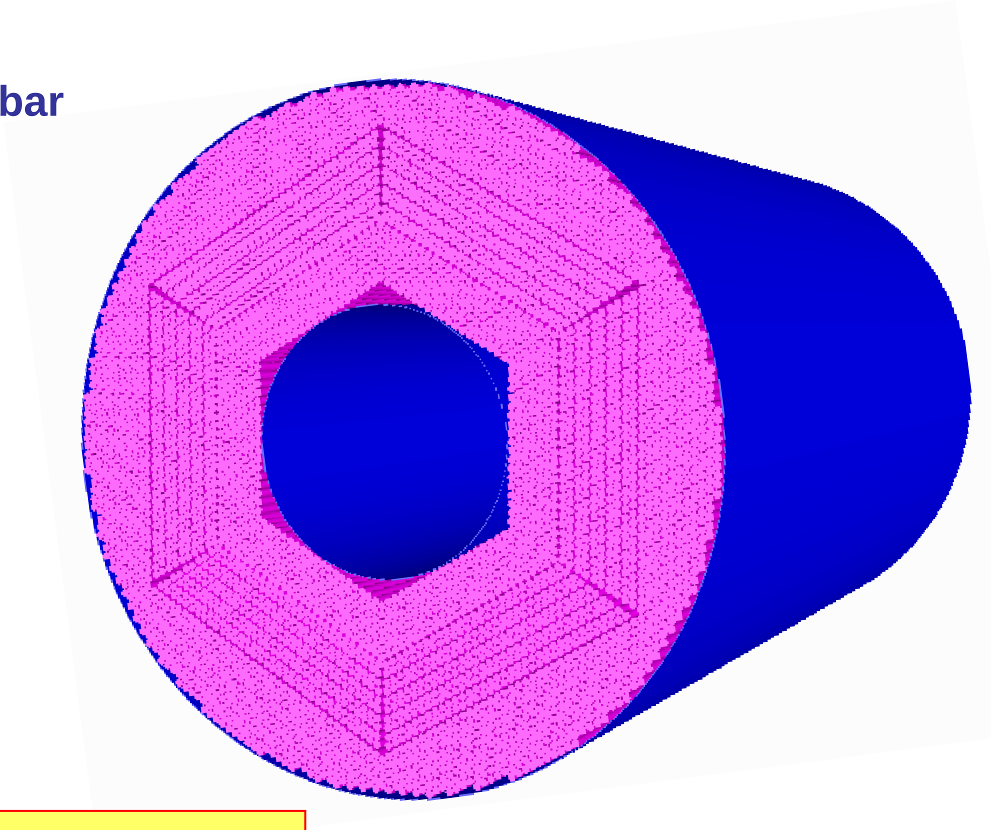
  150 – 420 mm

  Length 150 cm

STT Layout

5340 straws in 21-27 layers

- **Al-mylar film tube: 10.0 × 0.03 × 1500mm (Ø×d×L)**
- **R_{in}/R_{out}: 160 / 415- 420 mm, V = 610L**
- **Self-supporting straw layers at Δp ~ 1bar**
- **Straw pitch: 10.1mm**
- **15kg straw weight**
- **Ar/CO_2, p ~ 2 bar**



- **Axial layers:**

  $\sigma_{r\varphi}$ ~ 150μm, $A_\omega \times \varepsilon$ ~ 98%

- **Skewed layers:**

  σ_z ~ 2.9 mm, $A_\omega \times \varepsilon$ ~ 90-95%

- **Radiation length:**

  X/X_0 ~ 1.0-1.3 %

➔ σ_{pt} / p_t ~ 1.2 %

Simulations: detector definition

- Maximum material budget allowed:

  Detector and mechanical support structure

- Evaluate detector occupancy:

  Define tube’s diameter

- Number of total layers

  Evaluating benefits of shorter straw to fill-up gaps

- Number of skew layers and their location:

  Skew angle

  Outside vs middle positioning

- Check of different geometries to find the best solution in terms of acceptance and material budget

Need of an interface between CAD files and simulation geometry files

Simulations: detector performance

- Possibility of PID using dE/dx measurements

    ADC vs Time over Threshold

- Tracking accuracy in non-uniform magnetic field:

    different gas mixtures

    Lorentz angle evaluation

- Pile-up and global tracking

Simulations: physics channles 1

$$\bar{p}p \to D\bar{D}(D^{*}\bar{D}^{*})$$

Decays of *D* mesons (*D⁰*, *D±*) via charged prongs produce high multiplicity events:

$$D^{\pm} \to K^{\pm}\pi^{\mp}\pi^{\mp}$$

$$D^{0} \to K^{\pm}\pi^{\mp}$$

Many particles in a wide momentum range. All must be detected to reconstruct *DD* invariant mass

$$\bar{p}p \to \eta_c \to K_S^0 K^{\pm}\pi^{\mp}$$

These channels are good to check efficiency and momentum resolution in a wide energy region

Simulations: physics channles 2

Channels with Baryon-Antibaryon are important to check STT secondary vertices capability.

$$\bar{p}p \to \Lambda\bar{\Lambda}$$

$$\bar{p}p \to \Omega\bar{\Omega}$$

Here we can probe real needs of σ_z resolution and choose the proper technical solutions

$$\bar{p}p \to p\bar{p}$$

Evaluation of the linear charge density along the tubes

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Conclusions

From Montercarlo simulation we expect to leaarn:

- Detector occupancy;
- Momentum spread of outgoing particles;
- Maximum allowed materail budget;

Channels to simulate:

$p\bar{p} \rightarrow D\bar{D}$

$p\bar{p} \rightarrow D\bar{D}^*$ *Fom: high multiplicities wide momentum range*

$p\bar{p} \rightarrow \eta_c \rightarrow K^0_S K^\pm \pi^\pm$

$p\bar{p} \rightarrow$ *Barion-Antibarion* *Fom: secondaries vertices z coord. resolution*