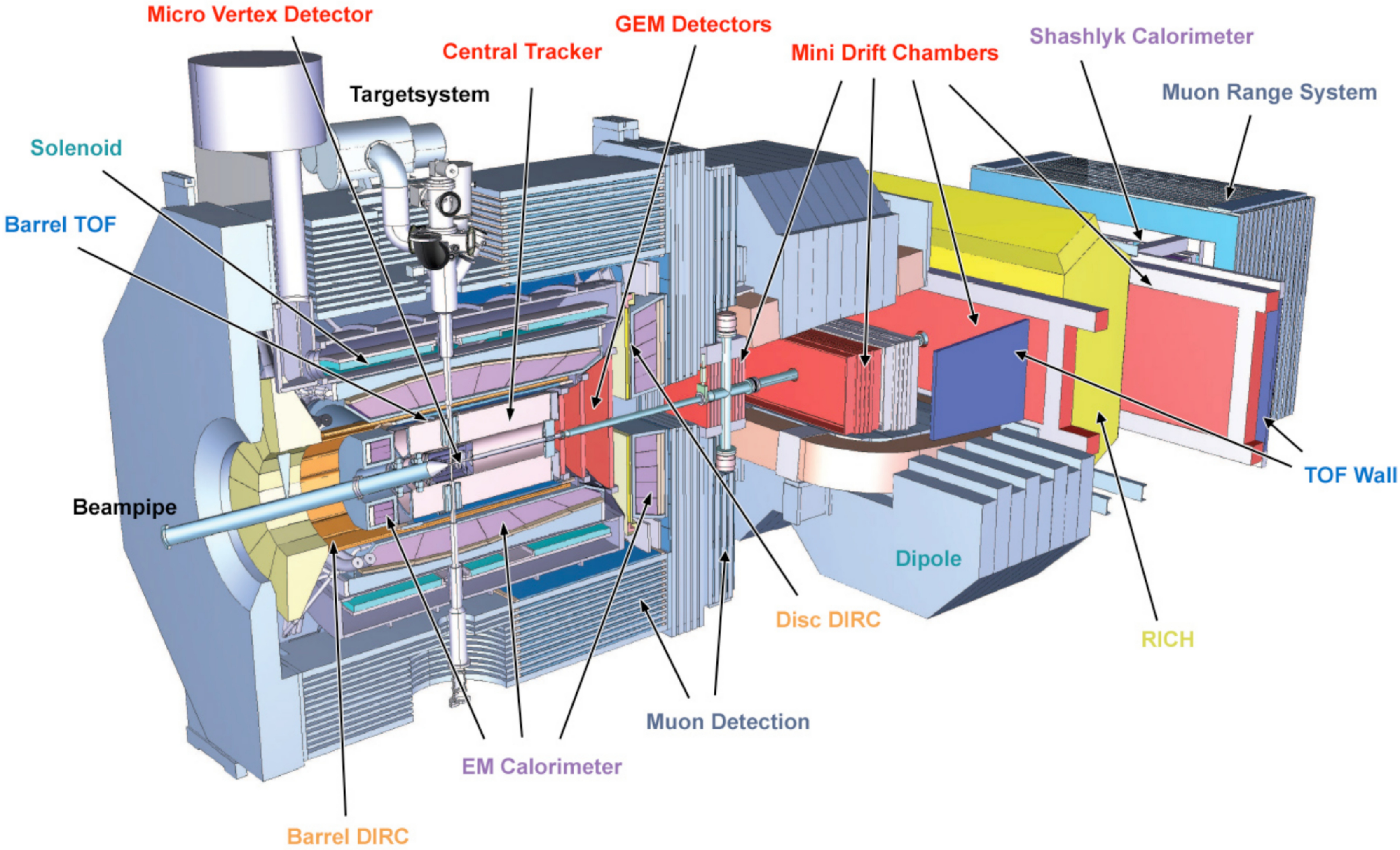
Development of a transverse polarised target in the PANDA-Detektor

- Experiment and the PANDA-Detektor
- Options for realisation of a transverse polarisation
- Setup with superconducting shielding tube
- Mathematic modell and assumptions
- Preliminary Results
- Conclusion

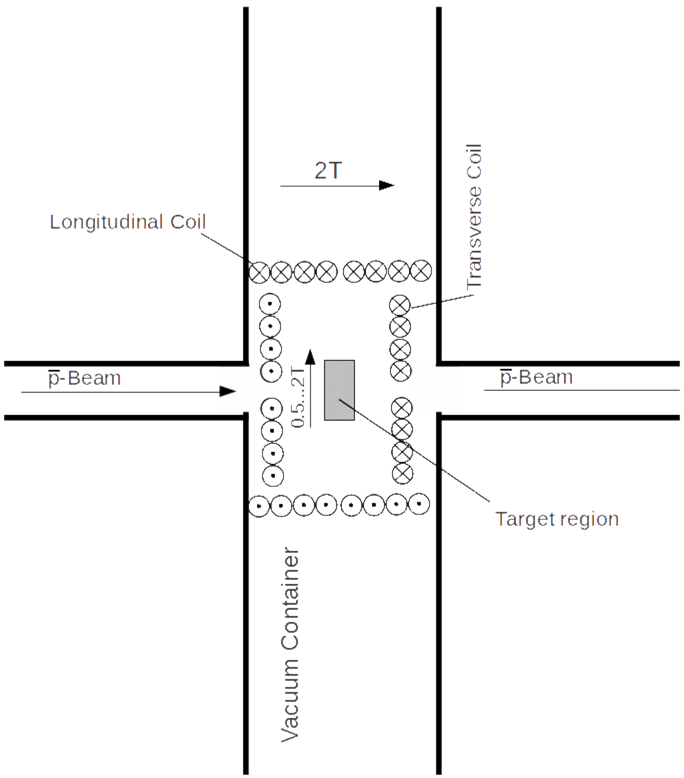
PANDA

Extraction of the immaginary part of the FF with singel spin measurement

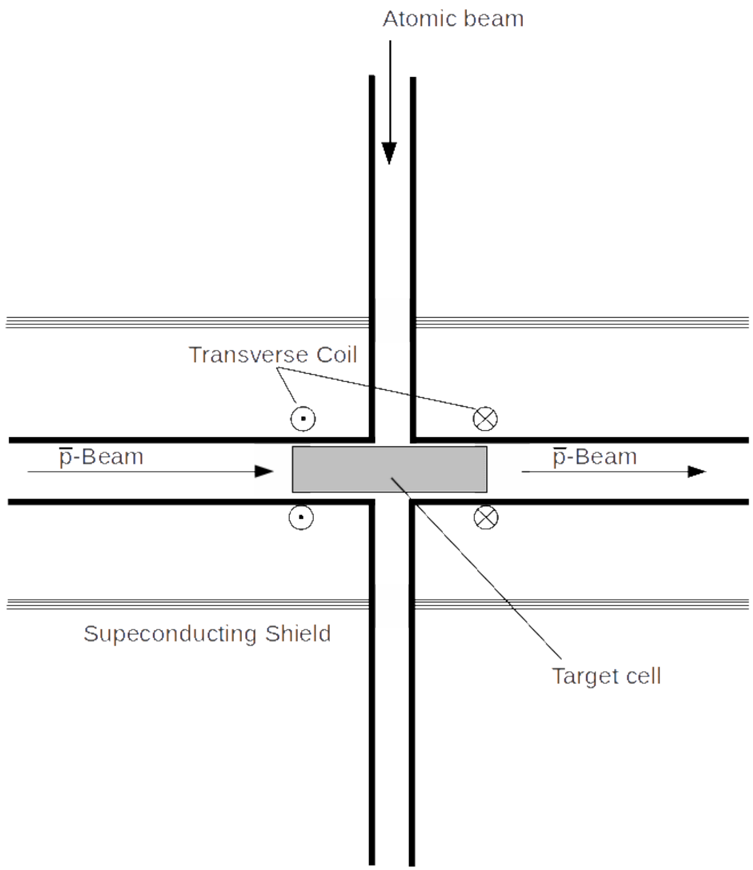


Realisation

- Helmholtz-like constellation

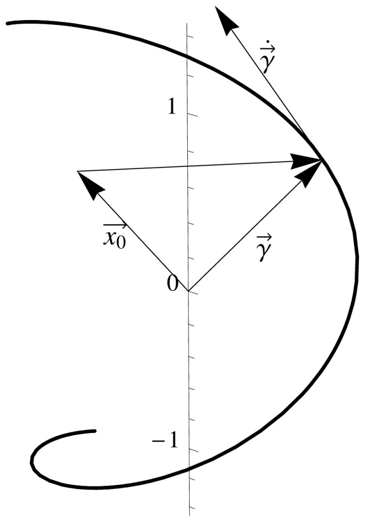


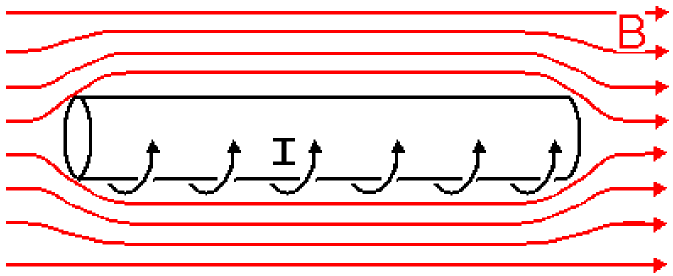
- Superconducting tube (long. or transv.)



Assumptions (Model)

- Tube operates like a usuall solenoid (passive)
  - Dense winded solenoid with current density J_c
  - Simulation with Mathematica (Biot-Savart)
  - Calculation of pressure and torque





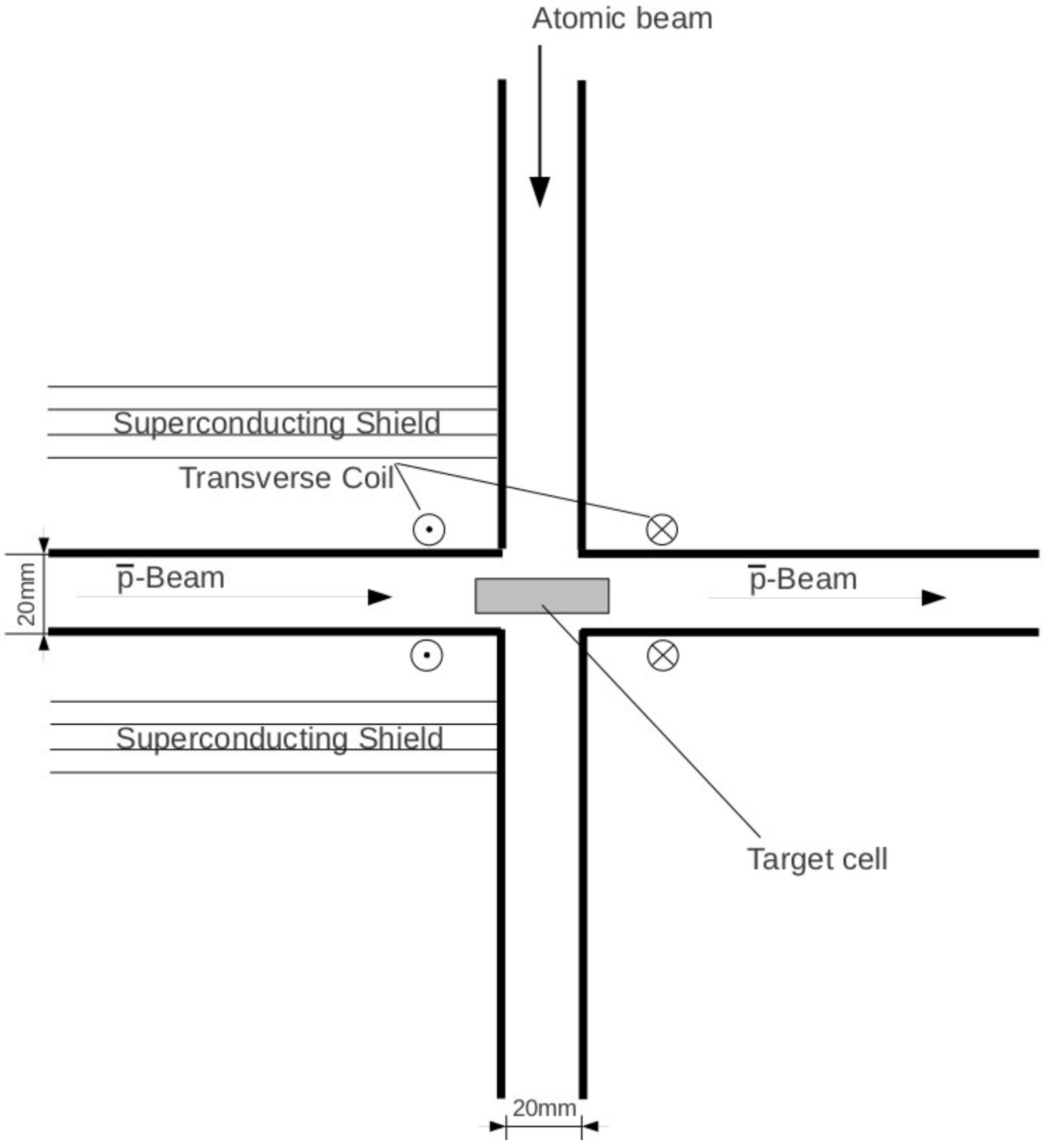
$$\vec{\gamma}(t) = (x(t), y(t), z(t))$$

$$dl = \sqrt{\dot{\vec{\gamma}}(t)\dot{\vec{\gamma}}(t)}dt$$

$$\overrightarrow{B}(\overrightarrow{x_0}) = \frac{\mu_0}{4\pi} I \int \frac{(\vec{\gamma}(t) - \overrightarrow{x_0}) \times \frac{\dot{\vec{\gamma}}(t)}{|\dot{\vec{\gamma}}(t)|}}{|(\vec{\gamma}(t) - \overrightarrow{x_0})|^3} dl$$

Fagnard, Shielding efficiency and E(J) characteristics measured on large melt cast Bi-2212 hollow Cylinders in axial magnetic fields

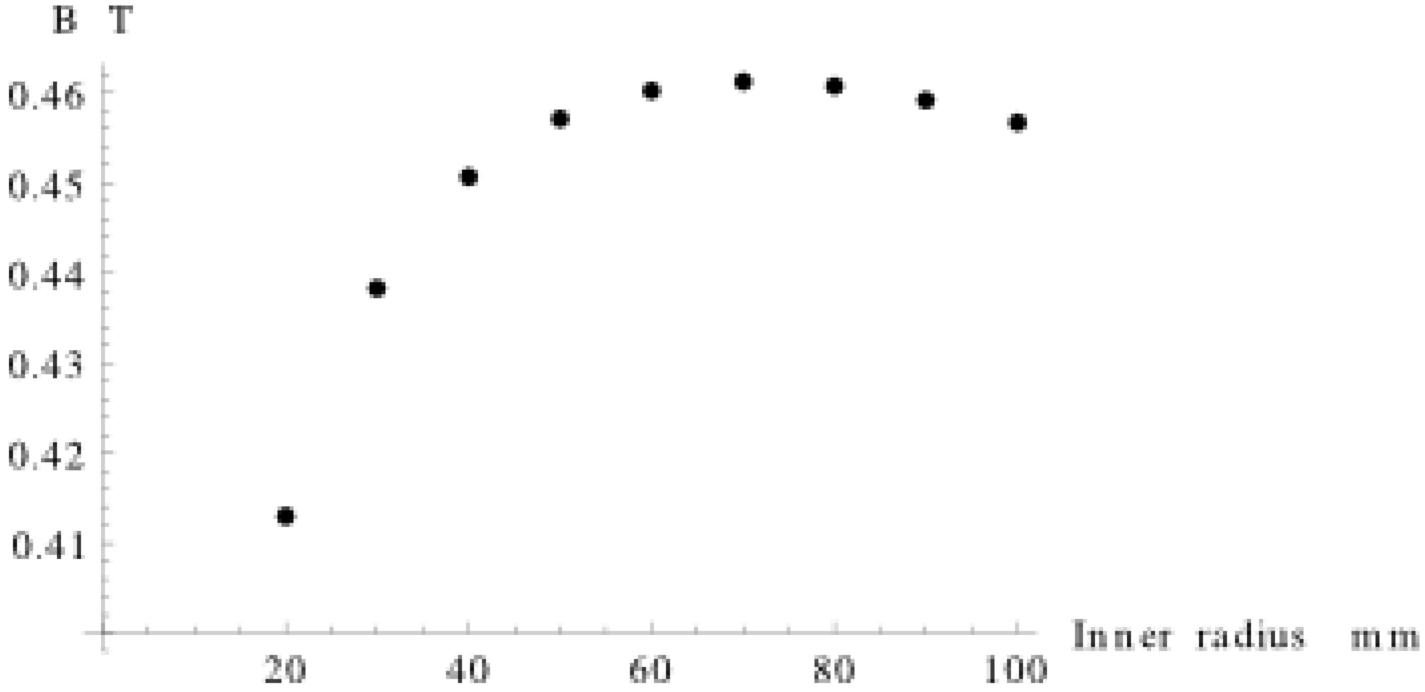
Superconducting tube (upstream)



Superconducting Tube upstream (200 mm)

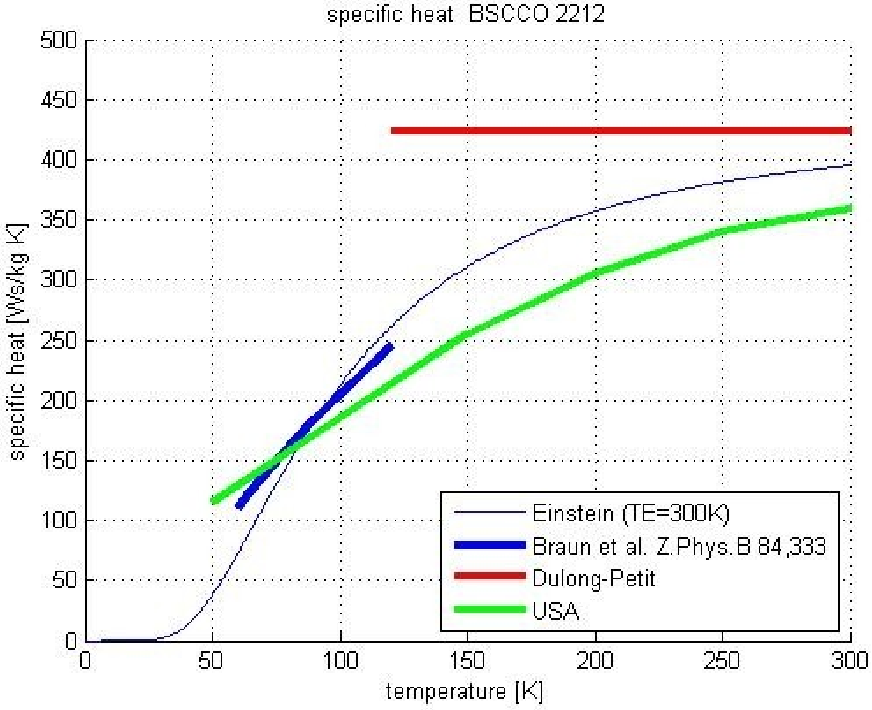
SL-Material $Bi_2Sr_2Ca_1Cu_2O_8$

$$J_C(T)=2{,}3\cdot 10^4\left(1-\frac{T}{92}\right)^{2,5}$$



Specification

Radiation length	Pressure	Stored Energy	Upper limit of temperature increasing because of operation failure	Length	Diameter	Thickness	Radiation length
1.5 cm (25% Energy loss of sec. el.)	Gleichgewicht	ca. 500 J	ca. 50 K	200 mm	160 mm	5 mm	1.5 cm (25% Energy loss of sec. el.)



Conclusion

- Various solutions for the problem
- One possible solution is shielding
- Simulation
- Specification

Next steps

- More Specifications
  - AC-Losses
  - Phase transition
- Test with 70 mm, 5mm SC-Tube

Test of the SC-Tube