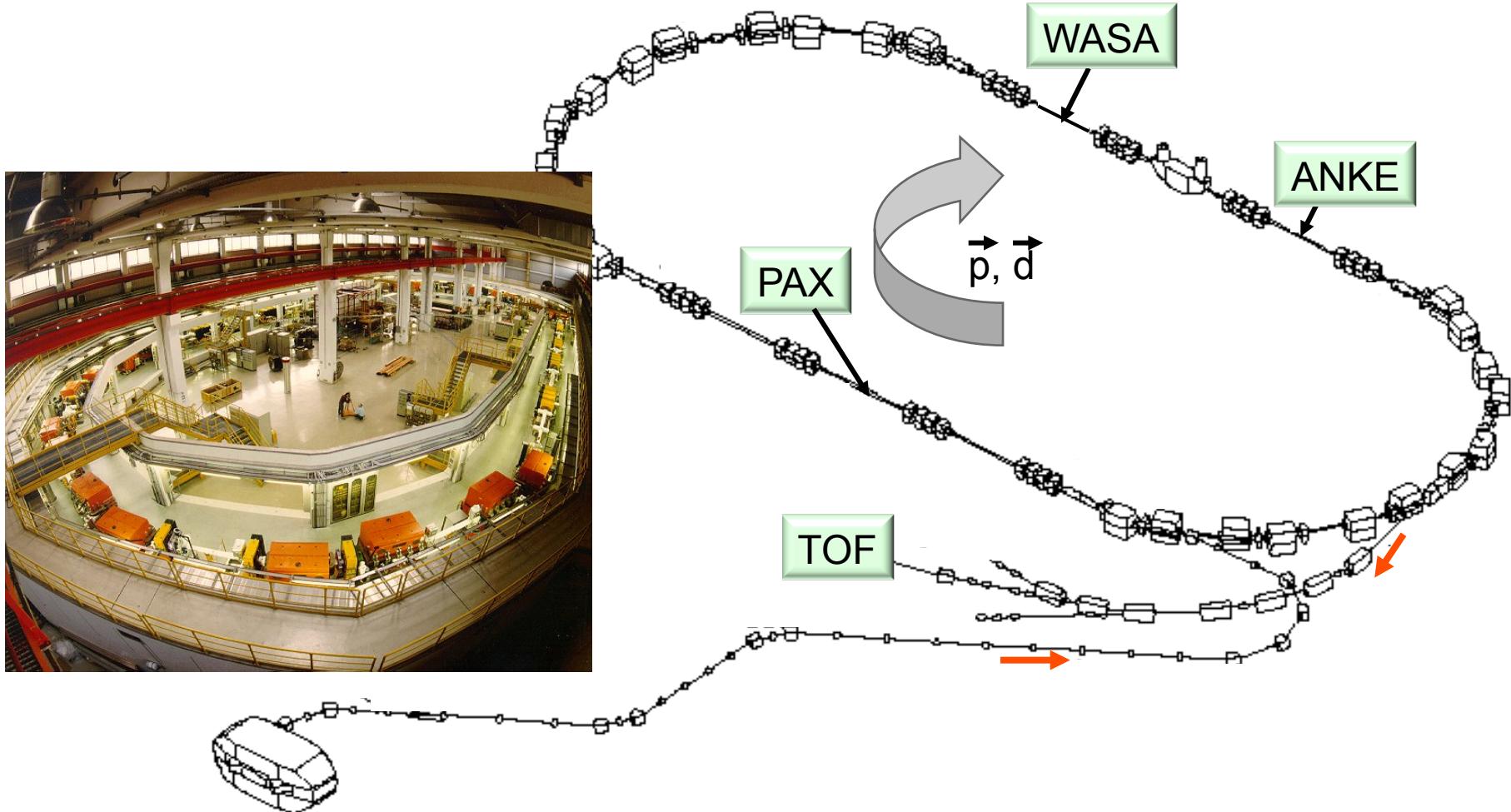


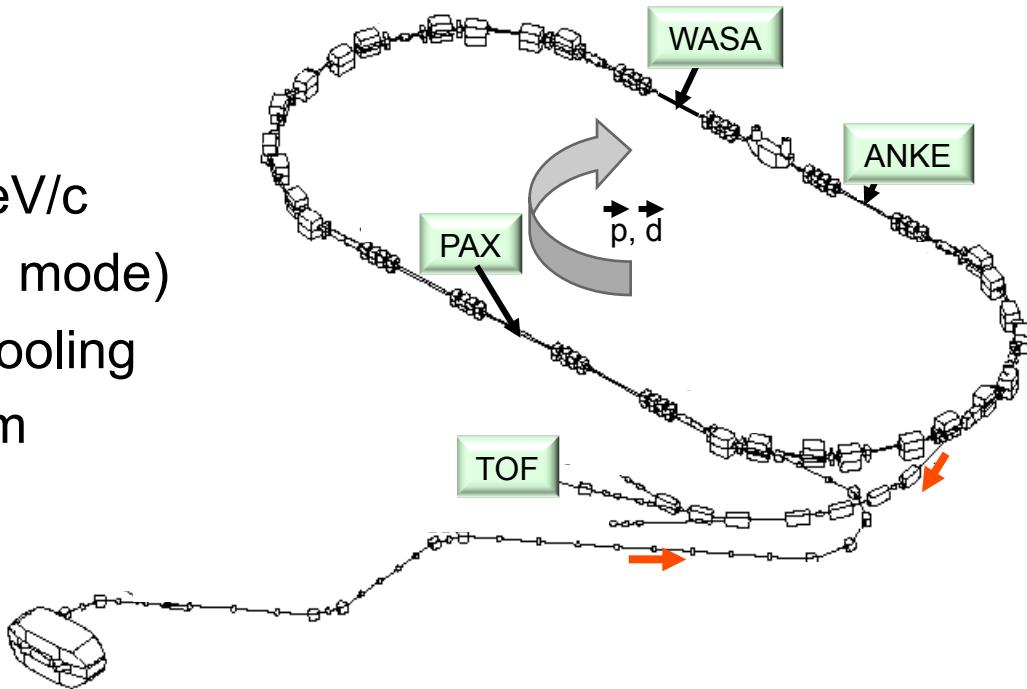
Instrumentations and Tools at COSY

4. May 2010 | David Chiladze, HEPI, Tbilisi State University
IKP, Forschungszentrum Jülich

COSY Facility

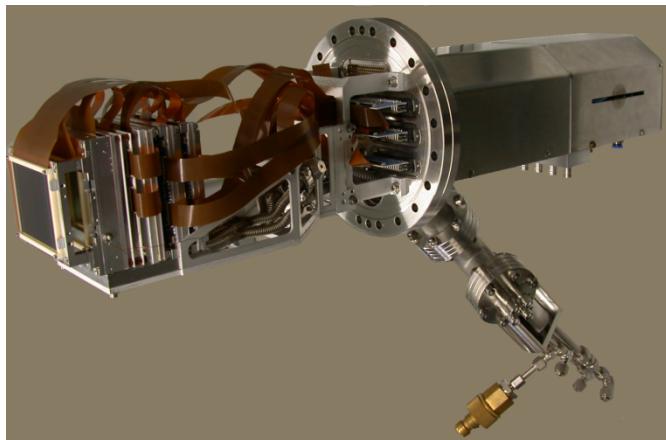
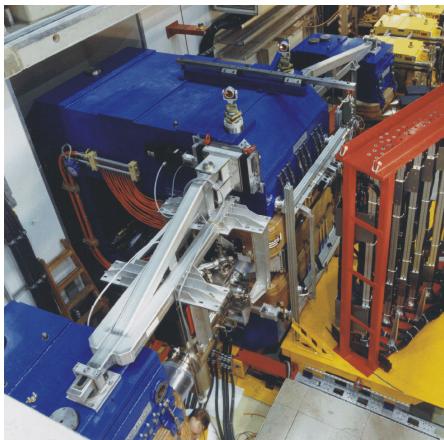
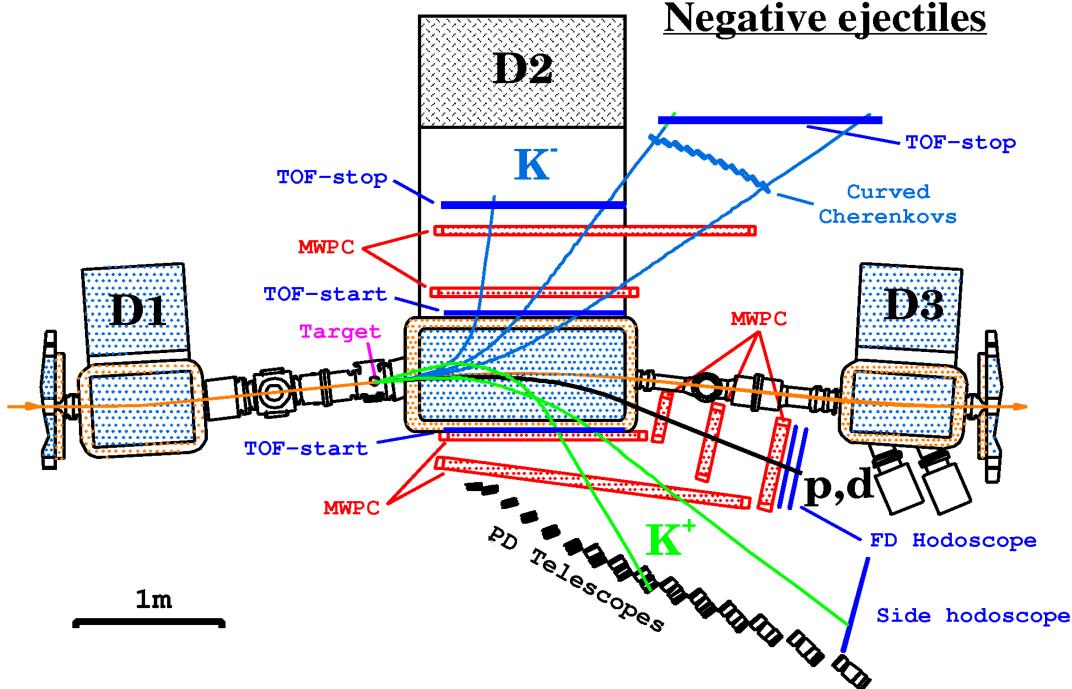


- Energy range:
0.045 – 2.8 GeV (p)
0.023 – 2.3 GeV (d)
- Max. momentum $\sim 3.7 \text{ GeV}/c$
- Energy variation (ramping mode)
- Electron and Stochastic cooling
- Internal and external beam
- High polarisation (p,d)
- Spin manipulation



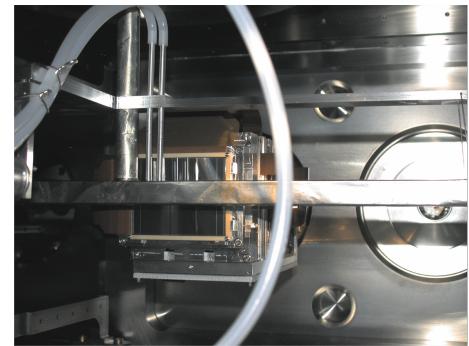
Detectors: ANKE

- Magnetic spectrometer (3 dipoles)
- Internal beam
- (Un-), polarised target (PIT)



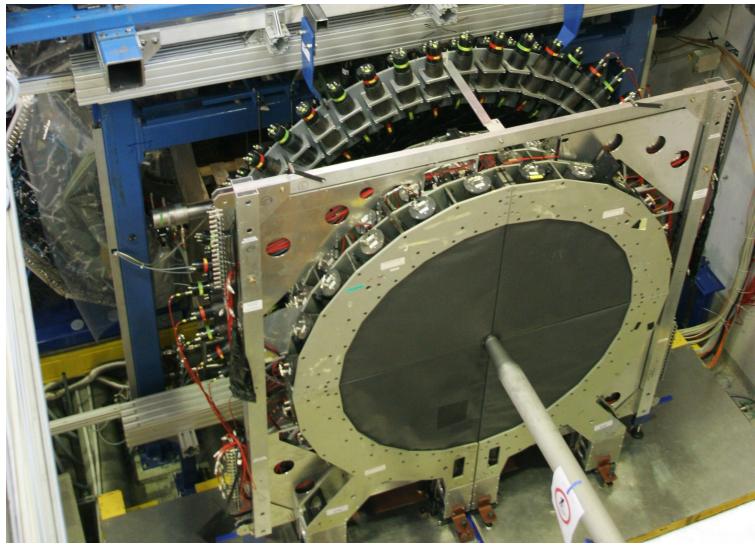
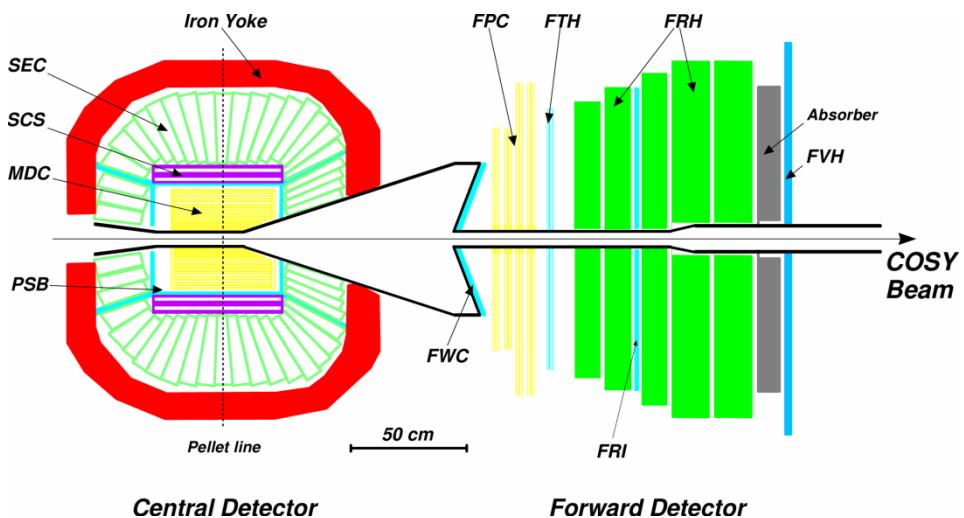
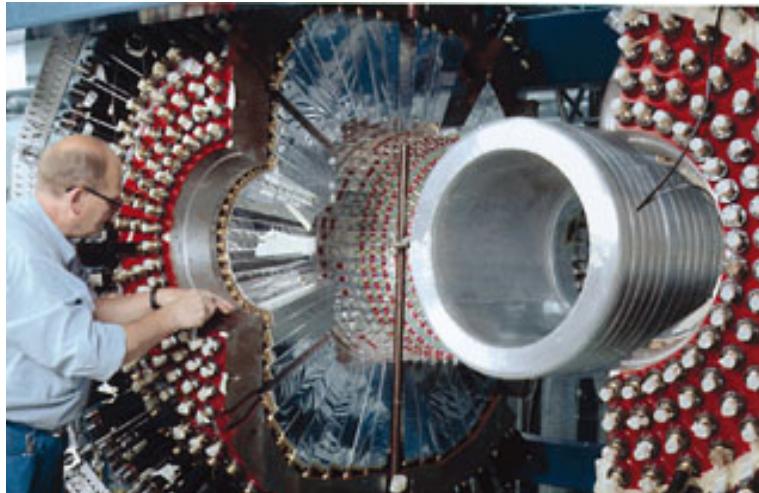
Negative ejectiles

Positive ejectiles



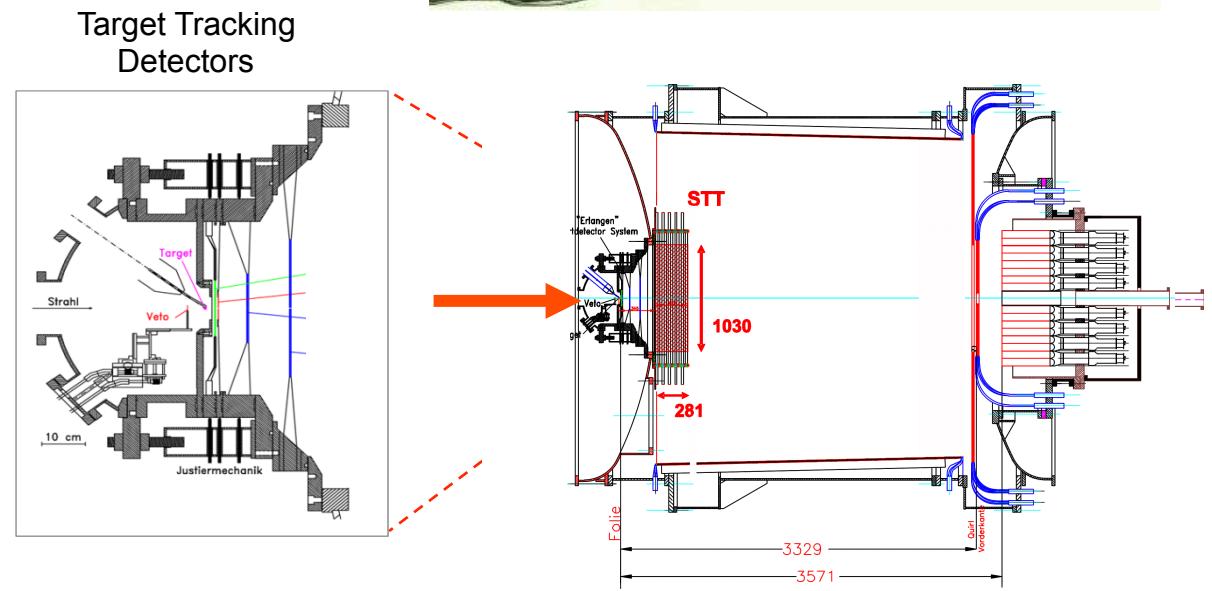
Detectors: WASA

- Internal beam
- Electromagnetic calorimeter
- SC solenoid
- Inner and forward tracking
- Pellet target (unpolarised)
- Charged particle and photon detection

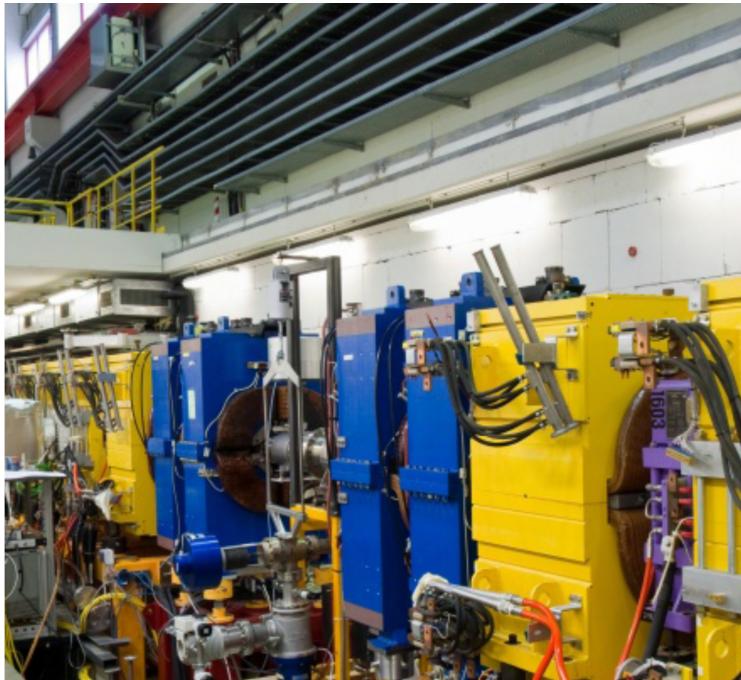


Detectors: TOF

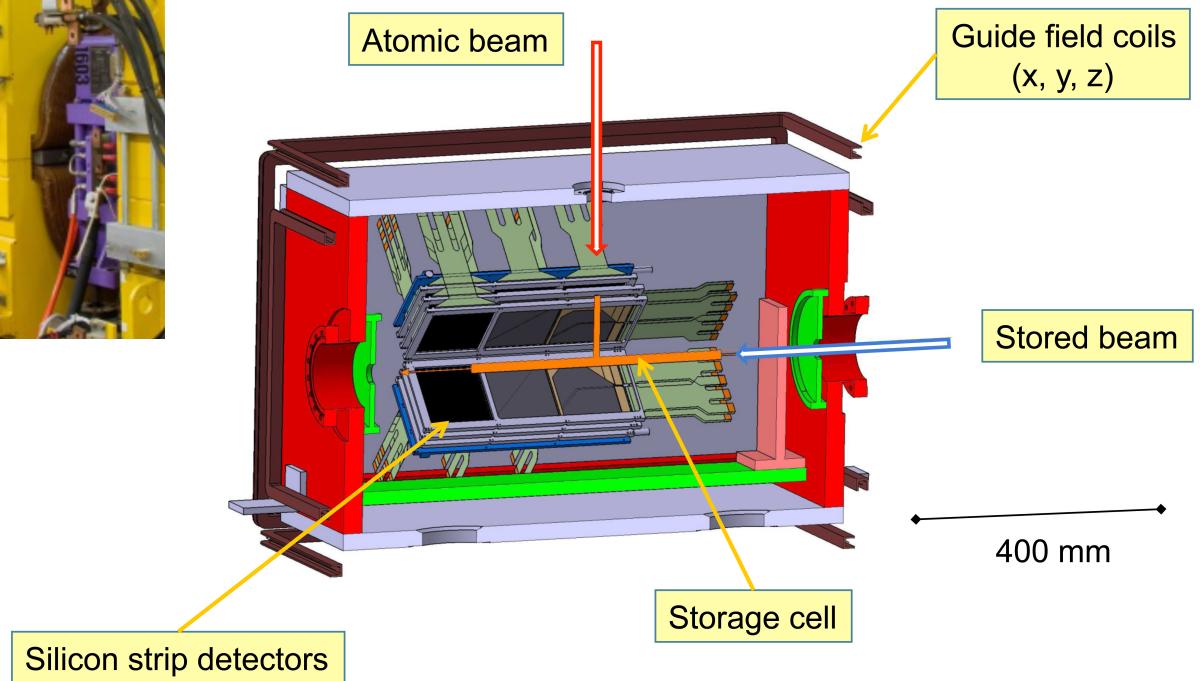
- Non-magnetic (t-o-f) spectrometer
- Extracted beam
- Large acceptance
- Un- (polarised) cryo-targets



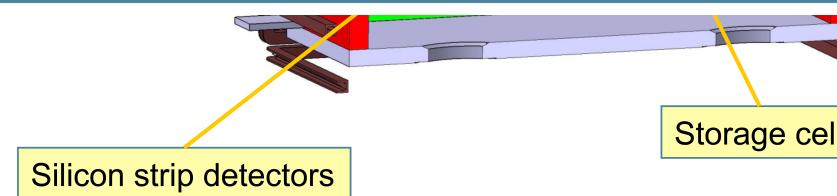
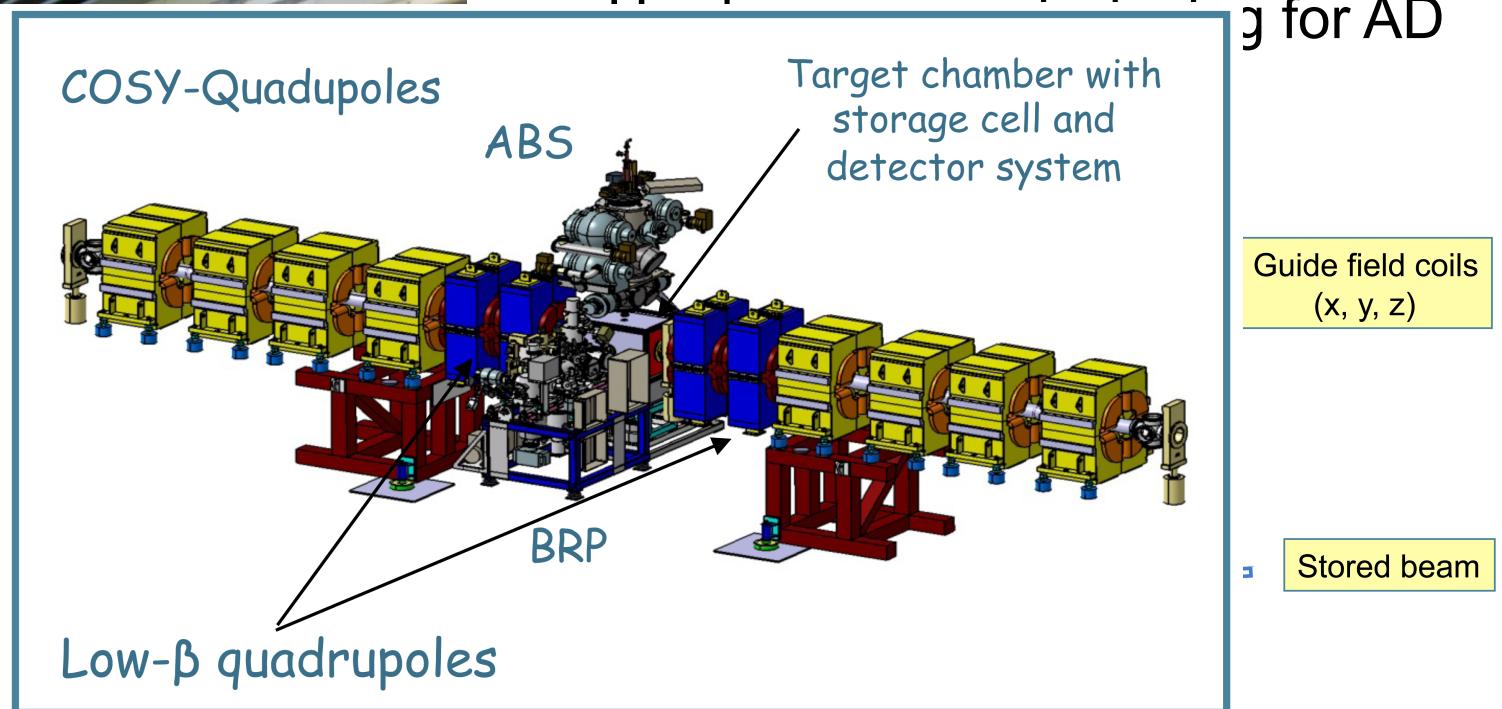
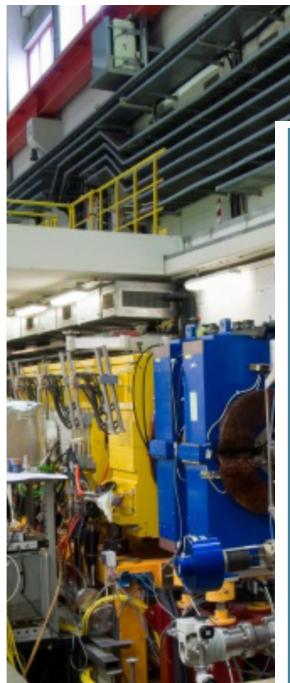
Detectors: PAX



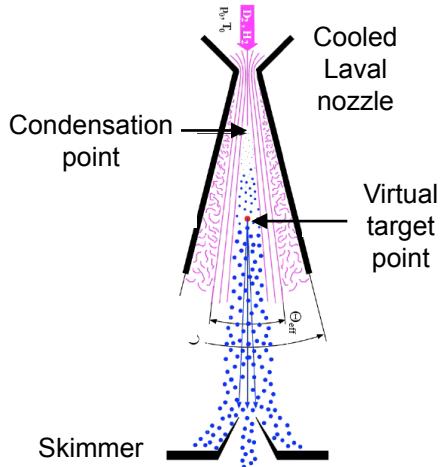
- Low beta section
- Understanding of spin-filtering
- Hardware commissioning for AD



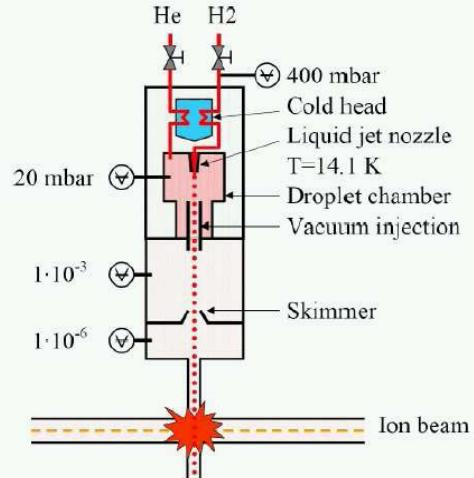
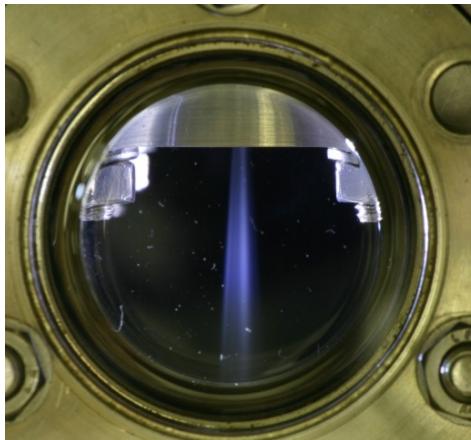
Detectors: PAX



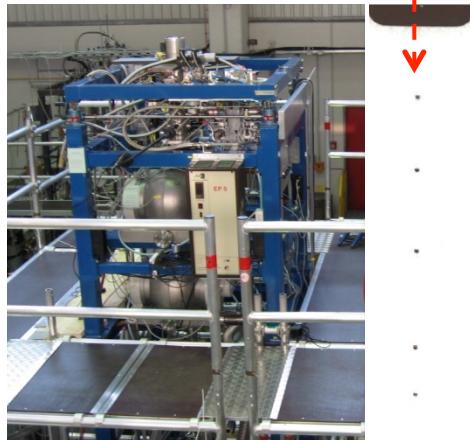
Targets



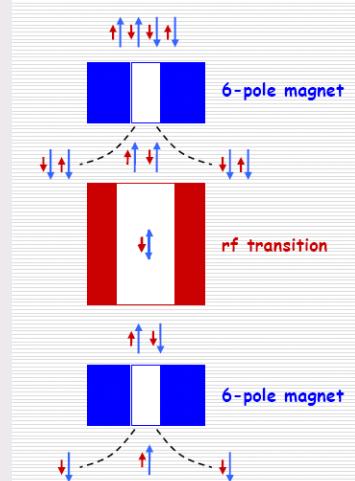
Cluster jet



Pellet



Operation principle:
Focussing
and
defocussing
of hydrogen
or
deuterium
hyperfine
states



Polarized (ABS)

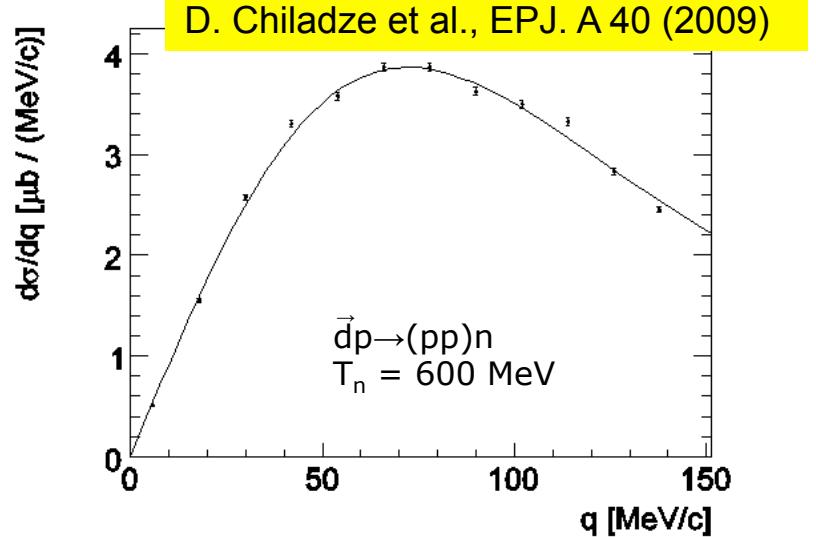
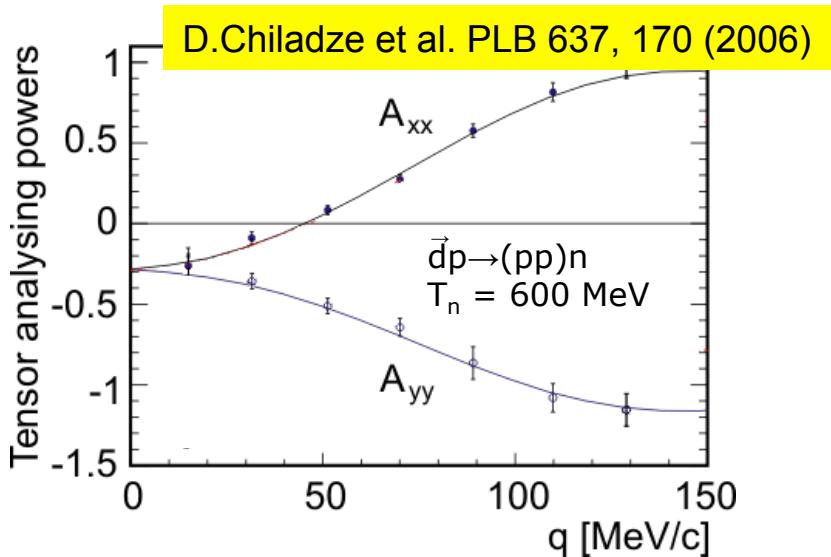
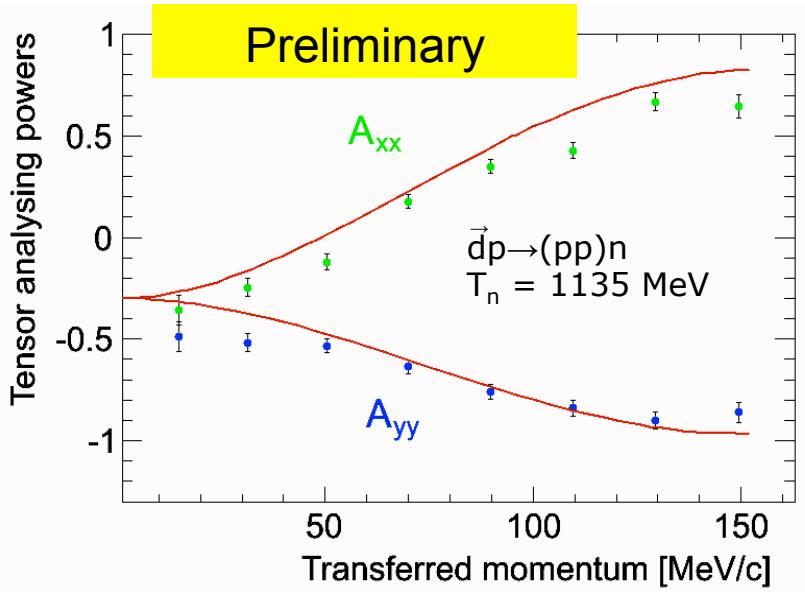


Spectroscopy, Spin, Symmetry

- NN-scattering
- Deuteron break-up
- Pion production
- η - ${}^3\text{He}$ interaction (FSI)
- Hyperon-Nucleon interaction
- Symmetry breaking

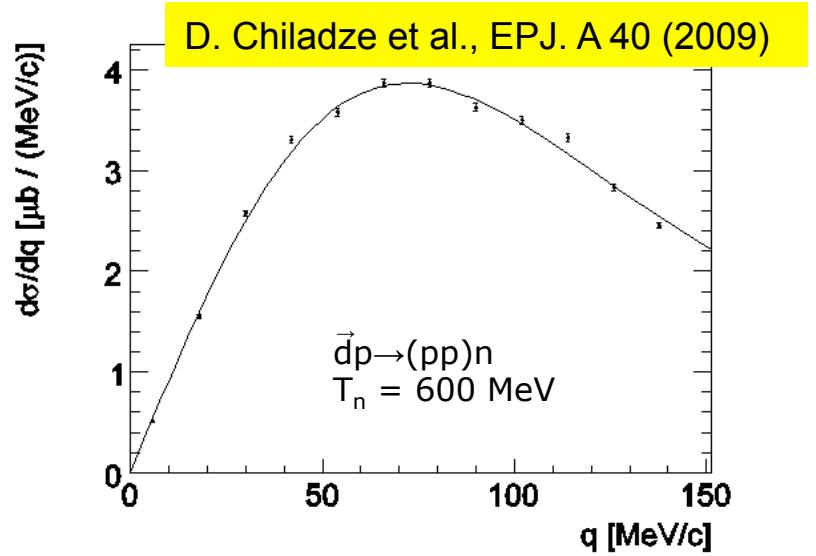
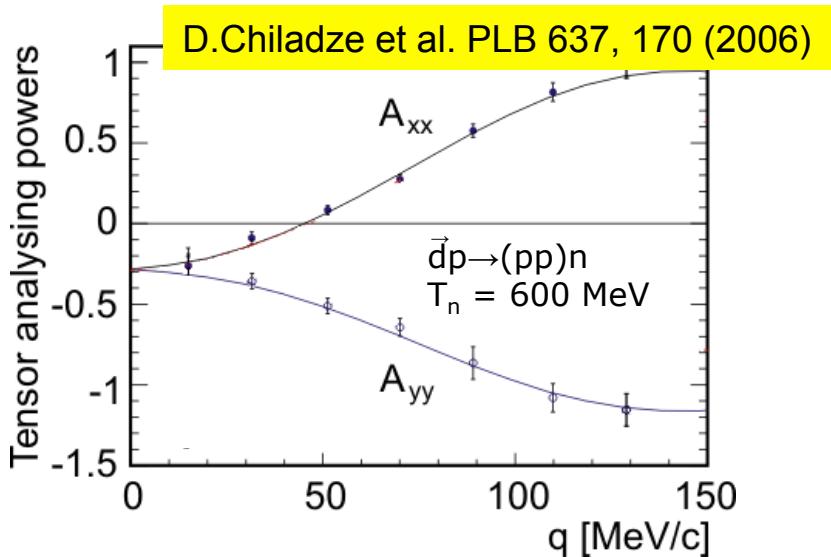
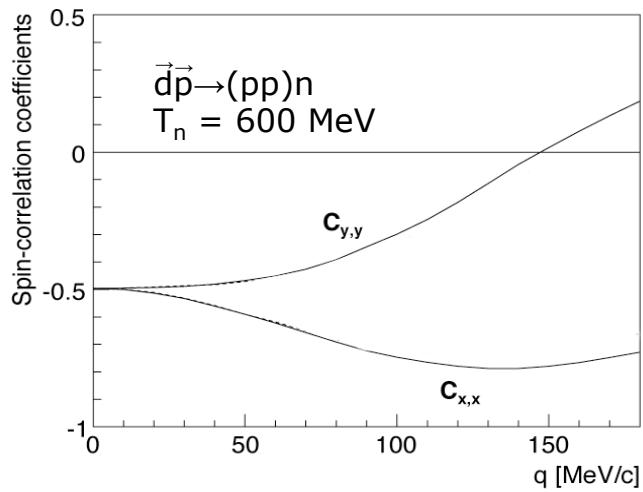
NN Interaction: np results at ANKE

- $\vec{d}p \rightarrow (pp)_{1S_0} n$
- Transition from deuteron to $(pp)_{1S_0}$:
 $p n \rightarrow n p$ spin flip
- np spin-dependent amplitudes:



NN Interaction: np results at ANKE

- $\vec{d}\vec{p} \rightarrow (pp)_{1S_0} n$
- Transition from deuteron to $(pp)_{1S_0}$:
 $p n \rightarrow n p$ spin flip
- np spin-dependent ampli. $\vec{d}\vec{p} \rightarrow (pp)n$
 $T_n = 600$ MeV



Summary

- COSY - unique opportunities for hadron physics with polarised hadronic probes (beam & target)
- Detectors: ANKE, TOF, WASA, PAX
- Physics: Spectroscopy, Spin, Symmetries