



Towards experiments with polarized beams & targets at GSI/FAIR
— Sequence of actions —

Frank Rathmann

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Sequence of actions I

Major steps required to realize ambitious goals exposed in LOI:

1. Installation of a hydrogen or deuterium polarized gas jet target:
 - ▶ Aim: study Radiative Electron Capture
 - ▶ Minimally invasive to present ESR environment
2. To unambiguously interpret spin asymmetries, e.g., measured using p or d beams, requires to feed ring with polarized p :
 - ▶ Polarized ion source, colliding beams source operated at COSY suitable.
 - ▶ Measurement of beam polarization enabled along accelerator chain.
 - ▶ Polarization preservation inside SIS 18 accelerator must be ensured. Entails internal polarimeter, a detector system, and a tune jump quadrupole system to overcome depolarizing resonances.
 - ▶ Inside ESR, requirements similar to SIS18: Needs a polarimeter and a system that allows one to maintain beam polarization during acceleration to desired experimental energy.

Sequence of actions II

3. Studies related to time-reversal violation (T-V), require upgrade of polarized gas target to include storage cell.
 - ▶ Insert low- β section in ESR.
 4. Extension of investigations toward spin-coherent ensembles of polarized stored particles needed for EDM or axion search.
 - ▶ Reaching long spin-coherence time requires chromaticity correctors and a very careful control of closed orbit in machine during measurements.
 - ▶ For time-reversal violation experiment, this feature is not needed!
- Expect time horizon of about ten years for steps 1. to 3.
 - Envisaged to employ also possibilities offered by the local injector of CRYRING to test/commission various techniques and instruments.
 - Depending on overall time line, exp'ts might be re-located to HESR, where more space for sophisticated insertions is available than at ESR.