

## 30 years of HERMES - how self-polarization in storage rings was exploited at HERA

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Three decades ago it became that the simple quark model approach for the proton failed in describing the spin structure —the spin contribution from quarks, as measured by the European Muon Collaboration (EMC), came out small, by far insufficient to explain the proton spin of  $1/2$ . The experiment utilized the polarized muon beam from CERN's SPS, which is naturally polarized originating from the weak decay of mainly pions. The EMC results triggered a wealth of activity trying to explain the “spin puzzle”, but also to confirm (or falsify) those findings.

Already some twenty years early, it had been demonstrated that electrons in a storage ring will also be polarized —under certain conditions and in particular if waiting sufficiently long enough. The verification of this Sokolov-Ternov effect will be celebrated today in a different talk from this one. However, this talk will concentrate on how the Sokolov-Ternov effect got exploited in the East Hall of the HERA storage rings at DESY to study the spin structure of the proton. It took five hard years to convince DESY to host a spin experiment and in particular that it was feasible to achieve sizable polarization of the 27.6 GeV electrons/positrons of HERA. Part of this effort also included convincing people to install a gas storage cell internal to the HERA lepton ring as part of a polarized gas target system.

When this experiment, HERMES, finally turned on in 1995, it marked the beginning of an extremely successful physics program that ran until 2007, the shutdown of the HERA facility. During those years, HERMES took a wealth of data with longitudinally polarized H, D, and  $^3\text{He}$  targets, with transversely polarized H, as well as a wide range of unpolarized nuclei. In fact, analysis and publication of these data are still ongoing, as for the other HERA experiments.

This talk will focus on some of the highlights of the HERMES program, with emphasis of exploiting the polarized beam, but also remembering some of the pioneering measurements, e.g., the first observation of the Sivers and Collins effects in semi-inclusive deep-inelastic scattering. Besides the discussion of the physics results, the talk will also reflect on the early years, e.g., on how the experiment and the collaboration was formed, to celebrate this milestone in nucleon-spin physics.

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