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From COSY to HESR and EDM-at-COSY — •Mei Bai — Forschungszentrum, Juelich, Germany

The COoler SYnchrotron (COSY) at Juelich is a low to medium energy accelerator of polarized and unpolarized protons and deuterons[1]. Equipped with both electron cooling as well as stochastic cooling, COSY was the working horse for hadron physics with internal target as well as extracted beam for external targets during the past two decades[2], and yielded many important physics results including the observation and confirmation of a di-baryon state[3]. Lately, COSY has transformed itself into an ideal test facility for various developments of accelerator and detector technology, including the High Energy Storage Ring (HESR) and the PANDA detector at Facility of anti-proton and Ion (FAIR). As one of the few polarized light ion accelerators in the world, COSY is an ideal facility for the R&D efforts towards a dedicated storage ring for direct charged particle's electric dipole moment (EDM) search, which can provide a direct understanding of the asymmetry between matter and antimatter in our universe[4]. This presentation reports the current status of COSY and its plans for HESR and storage ring based EDM search developments including a very first experiment to search the deuteron's EDM in COSY.

[1] R. Maier, Nucl. Inst. Meth. A390, 1 (1997) [2] K.-Th. Brinkmann, Physics Program at COSY, Proceedings of 11th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon, 2007 [3] P. Adlarson et al, PRL 112, 202301 (2014) [4] http://collaborations.fz-juelich.de/ikp/jedi/about/introduction.shtml