

Spin tune investigations for the storage ring EDM experiment at COSY

An experimental method which is aimed to find a permanent electric dipole moment (EDM) of a charged particle was proposed by JEDI (Juelich Electric Dipole moment Investigations) collaboration [1]. EDMs can be observed by their small influence on spin motion. The only possible way to perform a direct measurement is to use a storage ring.

For this purpose it was decided to carry out the first precursor experiment at the Cooler Synchrotron (COSY). Since the EDM of a particle violates CP invariance and is expected to be tiny, treatment of all various sources of systematic errors should be done with a great level of precision. The spin tune analysis method, which provides a possibility of spin tune determination with the accuracy of 10^{-10} , was invented recently. In parallel with that achievement a new spin tracking code was developed [2]. It is planned to use spin tune measurements as a tool of great precision for the precursor run.

The analysis of the last runs will be conducted in this talk. The change in spin motion generated by steerers and solenoids will be considered. The further improvement of the simulation program will be discussed, as well as the comparison of the simulation results with data collected during the experiment.

[1] A. Lehrach, F. Rathmann, J. Pretz et al., "Search for Permanent Electric Dipole Moments at COSY. Step 1: Spin coherence and systematic error studies", 2012

[2] A. Ivanov, "Matrix Integration of ODEs for Spin-orbit Dynamics Simulation", proc. IPAC 2014