

Spin Manipulation with an RF Wien-Filter at COSY

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The JEDI Collaboration (Jülich Electric Dipole Moment Investigations) is developing tools for the measurement of permanent EDMs (Electric Dipole Moments) of charged, light hadrons in dedicated storage rings. The Standard Model predicts unobservably small magnitudes for these EDMs. A non-vanishing value due to CP violating sources beyond the Standard Model may be detected by measuring a tiny vertical polarization buildup in a beforehand horizontally polarized beam. This technique requires a spin tune modulation by an RF Dipole without inducing any coherent beam oscillations.

In the course of 2014, a prototype RF ExB-Dipole has been successfully commissioned and tested at COSY (the Cooler Synchrotron) in Jülich, Germany. The force of a radial magnetic field is canceled out by a vertical electric one. In this configuration, the dipole fields form a Wien-Filter that directly rotates the particles' polarization vector and thus allows the determination of the beam and spin dynamics behavior of such a device. We verified that the RF Dipole can be used to continuously rotate the vertical polarization vector of a 970 MeV/c deuteron beam without exciting any coherent beam oscillations.

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