

## Contribution submission to the conference Münster 2017

**On the development of a novel waveguide RF Wien filter for Electric Dipole Measurements at COSY/Jülich** — ●JAMAL SLIM — Institute of High Frequency Technology, RWTH Aachen University, 52074 Aachen

The JEDI (Jülich Electric Dipole Investigations) Collaboration aims for measuring the electric dipole moments (EDMs) of deuterons and protons at the COoler SYNchrotron (COSY). In a magnetic storage ring like COSY, one way to do so, is via a new, high precision novel waveguide RF Wien filter. The basic idea is to modulate the spin of deuterons and protons with a Wien filter without perturbing the beam itself. With the field configuration generated by the device, the radial electric force is canceled by a vertical magnetic force, leading to zero Lorentz force acting on the particles. This field configuration is ensured by the propagation of the  $TM_{00}$  mode in the waveguide. This allows to directly manipulate the polarization vector of the particles without introducing any beam oscillations. The RF Wien filter is designed to operate at some harmonics of the spin precession frequency ranging from 0.1 to 2 MHz. The conditions of the Wien filter operation are met by design while being capable of generating high quality electromagnetic fields to the level of  $10^{-5}$ . With a 10 kW input power, the achieved B-field integral along the beam axis is approximately  $\int B \cdot dl = 0.0733$  T.mm. For systematic investigations of sources of false EDM signals, the waveguide RF Wien filter can be rotated by  $90^\circ$  around the beam axis.

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