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Design and performance of new electronic system of Cs-magnetometers array for the planned UCN EDM experiment at PSI

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The precise measurement and control of magnetic fields and magnetic field fluctuations is an important step for experiments searching for a permanent electric dipole moment (EDM) of the neutron, and is one of the main factors limiting the accuracy. In a project approved by Paul Scherrer Institute (PSI), a neutron EDM spectrometer is proposed.

For this experiment, together with Fribourg university, we have build arrays of Cs detectors and FPGA-DSP based electronics, with phase-locked schema to get stable operation of the Cs sensors.

Electronic module includes 16 channels, with independent phase locked feedback and digital frequency syntheses. Internal DSP helps to find a resonance frequency in quite big range of the magnetic field and has a enough speed to follow the changes of the magnetic field. DSP includes also different subroutines for data reprocessing, which could be updated trough internet communication.

First noise measurements shows quite promising results(below 300fT RMS) and electronic module is specifically good to find and lock narrow resonance lines.

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