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Development of a Time-of-Flight Grating Interferometer for the Measurement of the Neutron Electric Charge

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Neutron grating interferometers can be employed as powerful tools to perform high-precision measurements of deflection angles and scattering. A novel concept of a symmetric Talbot-Lau interferometer using three identical absorption gratings in a time-of-flight mode is under development at the University of Bern. The ultimate goal of this project is to conduct a sensitive measurement of the neutron electric charge and to improve the current best upper limit $(-0.4 \pm 1.1) \times 10^{-21} e$ [Baumann et al., 1988]. A proof-of-principle apparatus has been characterized at the cold neutron beamline BOA at the Paul Scherrer Institute, Switzerland. A description of the experiment, alignment procedures and first results concerning beam deflections measurements and the setup stability will be presented.

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