

FAKULTÄT für PHYSIK  
LUDWIG-MAXIMILIANS-UNIVERSITÄT  
MÜNCHEN/GARCHING

PHYSIK-DEPARTMENT  
TECHNISCHE UNIVERSITÄT MÜNCHEN  
MÜNCHEN/GARCHING

## MLL-KOLLOQUIUM

Donnerstag, 03.05.2018, 16<sup>15</sup> Uhr

Hörsaal der LMU in Garching, Am Coulombwall 1  
Treffen zum gemeinsamen Kaffee 16 Uhr

**Dr. Oleksandr Tomalak**

(Institut f. Kernphysik, Johannes Gutenberg Univ. Mainz)

### Low-energy proton structure and two-photon exchange corrections

Two experimental approaches to elastic electron-proton scattering, with and without polarized protons, have lead to strikingly different results for the ratio of the electric to magnetic form factors. Moreover, a significant discrepancy has been observed in the extraction of the proton charge radius from muon spectroscopy versus electron spectroscopy and elastic electron scattering. To complement these measurements, the muon-proton scattering experiment MUSE has been set up to extract the proton charge radius from elastic muon-proton scattering. The low-energy proton structure will be constrained further by measuring the ground state hyperfine splitting in muonic hydrogen by the experiments CREMA and FAMU. In my talk, I will discuss the two-photon exchange contribution as the largest uncertainty in analyzing these experiments and will provide our recent estimates. I will also present the dispersion relation approach to evaluate the two-photon exchange in the elastic electron-proton scattering, accounting for the leading elastic and first inelastic pion-nucleon intermediate states. I will compare theoretical calculations to recent data.

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