

# Physik-Kolloquium

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**Dienstag, den 09.12.2014, 16.00 Uhr**

**Dr. Randolph Pohl**

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## **Nuclear structure from laser spectroscopy of muonic atoms**

We have recently established laser spectroscopy of muonic atoms as a tool to measure properties of the lightest nuclei from the proton to helium-4. In muonic atoms, the heavy muon orbits a bare nucleus with a 200 times smaller Bohr radius, compared to its electronic counterpart. This results in a tremendously increased sensitivity ( $200^3$ ) of the muonic atom's S-states to the finite charge and magnetic radius of the nucleus.

Our proton charge radius  $R_p=0.84087(39)$  fm is ten times more accurate, but 7 sigma discrepant from the world average, which is based on elastic electron-proton scattering and precision spectroscopy of regular (electronic) hydrogen. Possible explanations of this "proton radius puzzle" include unexpected behaviour of the proton and to physics beyond the Standard Model. Our new data on muonic deuterium and helium may help to understand this puzzle, and will ultimately determine the radii of the lightest nuclei with 10 times higher accuracy.

**Ort: Hörsaal für Theoretische Physik, Linnéstraße 5**

**Alle Teilnehmer sind ab 15.30 Uhr zu Kaffee vor dem Hörsaal eingeladen.**