
Contribution ID: **17** Type: **Plenary**

# Precision calculations of charge radii of light nuclei

We present a high-precision calculation of the deuteron, triton, $^3$He and $^4$He charge
form factors based on the latest two- and three-nucleon forces,
and charge density operators derived up through the fifth order in the chiral effective field theory.

We predict the values of the structure radius and the quadrupole
moment of the deuteron, the $^4$He charge radius, and the isoscalar combination
of the 3N charge radii $(r^2(^3\mathrm{H}) + 2r^2(^3\mathrm{He}))/3$. A comprehensive and systematic
analysis of various sources of uncertainty in all our predictions is performed.

Using the predicted value for the deuteron structure radius together with the very accurate atomic data for the
difference of the deuteron and proton charge radii we extract the charge radius of the neutron.

Finally, using the predicted isoscalar combination of the 3N charge radii
and preliminary experimental data on the $^3$He charge radius we estimate the charge radius of the triton.

**Primary authors:** NOGGA, Andreas (Forschungszentrum Jülich); FILIN, Arseniy (Ruhr University Bochum); KÖRBER, Christopher (Ruhr University Bochum); MÖLLER, Daniel (Ruhr University Bochum); EPELBAUM, Evgeny (Ruhr University Bochum); KREBS, Hermann (Ruhr University Bochum); REINERT, Patrick (Ruhr University Bochum); BARU, Vadim (Ruhr University Bochum)

**Presenter:** FILIN, Arseniy (Ruhr University Bochum)