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Charge radii determined by laser spectroscopy of He-like ions

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The atomic structure of few-electron systems is well understood and allows for accurate ab initio calculations of mass-shift and field-shift factors in non-relativistic quantum electrodynamics calculations (NR-QED) to extract precise nuclear charge radii. We have started to determine absolute and differential charge radii of the light elements from Be to N using collinear laser spectroscopy. Helium-like ions of these species provide laser-accessible atomic transitions that can be calculated with the required accuracy in the NR-QED approach. As a first step, the 1s2s 3S1 ⟶ 1s2p 3P transitions in 12–14C4+ were determined using the Collinear Apparatus for Laser Spectroscopy and Applied Science (COALA) at the Technical University of Darmstadt. Moreover several charge states of B have been addressed.

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