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Quadrupole dynamics of carbon isotopes and 10Be

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Mn/Mp, the ratio of neutron to proton quadrupole transition matrix elements has been successfully measured in recent experiments. We perform for the first time a systematic theoretical study of *Mn/Mp* with the *ab initio* no-core shell model (NCSM) for five carbon isotopes and 10Be. We find a good agreement with the available experimental data.
Using the *ab initio* NCSM, we also calculate *Qn*, the neutron quadrupole moment, and *MnQp/MpQn*, the ratio of *Mn/Mp* over the ratio of neutron to proton quadrupole moments *Qn/Qp*, showing good convergence. *Qn* can be extracted from the combination of our well-converged *MnQp/MpQn* results and experimental data for *Mn/Mp* and *Qp*. Although *Qn* itself is not directly accessible experimentally, its studies are interesting and significant since it plays a crucial role in the neutron-proton asymmetry in quadrupole deformation.

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