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Stabilizing Bohr wavepackets by electron-electron interaction[1] M. SCHEUCHER, D. WIRTITSCH, M. HILLER, S. YOSHIDA, J. BURGDORFER, Vienna University of Technology, S. YE, X. ZHANG, F.B. DUNNING, Rice University — Recently, so-called Bohr wavepackets have been realized experimentally in which a radially- and angularly-localized electron wavepacket travels along a circular orbit around the nucleus. Due to the non-equidistant energies of the constituent energy eigenstates, these Bohr wavepackets disperse but can be stabilized by external electric fields. Here we investigate the possibility of stabilizing such wavepackets in helium-like doubly excited Rydberg atoms through the electron-electron interaction without the need to resort to external driving fields. Our stability analysis indicates that a non-dispersive wavepacket can be created following the previously suggested "shape preserving" orbit for which the exchange of angular momentum between the two electrons is suppressed. The important role of electron-electron correlations in this stabilization mechanism is discussed.

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