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Finding α -clustering in ultrarelativistic heavy-ion collisions

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Measurements of anisotropic flow in relativistic heavy-ions have been shown to be highly sensitive to nuclear structure. With a proposed $^{16}\text{O}^{16}\text{O}$ run at the Large Hadron Collider and RHIC we study the potential for finding α -clustering in ^{16}O . Here we couple the iEBE-VISHNU event-by-event hydrodynamic package with ^{16}O nucleonic configurations from ab initio nuclear lattice effective field theory simulations. The transport model parameters used were obtained from a state-of-the-art Bayesian analysis in p-Pb and Pb-Pb collisions. We argue for two clear signals of α -clustering at both RHIC and LHC energies: first, that $c_2\{4\}$ should experience a sign change at $\sim 20\%$ centrality with α -clustering (in contrast to $\sim 50\%$ using a Woods-Saxon), and second, that the centrality dependence of $v_n\{2\}$ should differ dramatically between the two beam energies.

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