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Charged hadron spectra and anisotropic flows in O+O, Kr+Kr, and Xe+Xe collisions at $\sqrt{s_{NN}} = 6$ GeV using the UrQMD model

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The momentum spectra of charged hadrons reflect the kinetic freeze-out conditions in nuclear collisions. Analysis of these spectra enables quantitative extraction of the system's thermodynamic parameters. The anisotropic flows probe the system's collective behavior and its evolution from initial spatial anisotropy to final momentum-space correlations.

In this work, the Ultra-relativistic Quantum Molecular Dynamics (UrQMD) model is employed to investigate transverse momentum (p_T) spectra and anisotropic flow coefficients (v_n) of charged hadrons in O+O, Kr+Kr, and Xe+Xe collisions at $\sqrt{s_{NN}} = 6$ GeV, addressing the physics program of the upcoming SPD experiment at NICA. The kinetic freeze-out temperature and radial flow velocity are extracted from these spectra using Blast Wave parametrization. The elliptic (v_2) and triangular (v_3) flows are presented as functions of the collision centrality. A systematic comparison of thermal and collective properties across different colliding systems is performed. The obtained results contribute to understanding strongly interacting matter in the NICA energy regime.

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