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Theory of Frenkel Excitons in Planar Arrays of Perovskite Quantum Dots*

© *I.A. Vovk, N.V. Tepliakov, A.S. Baimuratov, M.Yu. Leonov, A.V. Baranov, A.V. Fedorov, and I.D. Rukhlenko*

Information Optical Technologies Center, ITMO University,
197101 St. Petersburg, Russia
e-mail: ilia.a.vovk@gmail.com

Of primary interest for the design of novel optoelectronic devices are densely packed ordered arrays of quantum dots (QDs), which can be produced via self-assembly or other nanofabrication techniques. In such arrays, also known as supercrystals, the interaction between the QDs results in a collective optical response. Despite the active research on arrays made of perovskite QDs, a rigorous theory of their collective excitations is still lacking. In this Paper, we develop a quantum-mechanical theory of Frenkel excitons in planar perovskite QD arrays with square lattice.