

Abstract Submitted  
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**Emergent  $U(1)$  Symmetry in Square Lattice Quantum Dimer Models** SYLVAIN CAPPONI, DAVID SCHWANDT, Laboratoire de Physique Théorique, CNRS & Université de Toulouse, F-31062 Toulouse, France, SERGEI ISAKOV, Institut für Theoretische Physik, ETH Zürich, CH-8093 Zürich, Switzerland, RODERICH MOESSNER, Max Planck Institut für komplexe Systeme, Nöthnitzer Straße 38, D-01187 Dresden, Germany, ANDREAS LÄUCHLI, Institut für Theoretische Physik, Universität Innsbruck, A-6020 Innsbruck, Austria — We report an exact diagonalization study of Rokhsar-Kivelson quantum dimer models on square lattice. Using a finite-size scaling analysis of excited energy levels, we are able to identify a regime of length scales where the quantum dimer model exhibits a  $U(1)$  symmetry. Dimer order parameter histograms confirm this remarkable symmetry. Beyond this crossover length, columnar dimer order emerges at least for  $v/t \lesssim 0.6$ . Our interpretation is supplemented with field-theory analysis as well as large-scale quantum Monte-Carlo simulations.

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