Determination of quantum critical point for superfluid-insulator transition in the disordered two-dimensional Bose-Hubbard model[1] FEI LIN, Physics Department, University of Illinois at Urbana-Champaign, ERIK S. SORENSEN, Department of Physics and Astronomy, McMaster University — We study superfluid-insulator transition for the disordered two- dimensional Bose-Hubbard model with quantum Monte Carlo simulations. Critical point for on-site Hubbard interaction strength U_c is determined by finite-size scaling for fixed particle density $\rho = 0.5$ and on-site disorder potential amplitude $\Delta = 12$. We show that an extremely large number of disorder samples is required for such a calculation, implying that previous calculations based on a small number of disorder samples may not be reliable. At the critical point, we also compute the universal DC conductivity value to be $\sigma_{\mathrm{DC}} = 0.85\sigma_Q$, where $\sigma_Q = 4e^2/h$ is conductivity "quantum".

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