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Two distinct Mott-Insulator to Bose-glass transitions and breakdown of self averaging in the disordered Bose-Hubbard model SEUNGMIN HONG, FRANK KRUGER¹, PHILIP PHILLIPS, University of Illinois, Urbana-Champaign — We show that two fixed points govern the Mott insulator to Bose glass transition in the disordered Bose-Hubbard model. At incommensurate fillings, the correlation length and the inverse compressibility diverge with exponents of $\nu = 1/D$ and $\gamma = 4/D - 1$, respectively, D the spatial dimension. We show that it is the breakdown of self-averaging (rare-region Griffiths physics) in the Bose glass that leads to a violation of the bound $\nu \geq 2/D$. At commensurate fillings, the transition is controlled by a different fixed point at which both the disorder and interaction vertices are relevant.

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