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AC conductivity across the disorder driven superconductor insulator transition¹ YEN LEE LOH, KARIM BOUADIM, NANDINI TRIVEDI, MOHIT RANDEIRA, The Ohio State University — The superconductor-insulator transition (SIT) is defined, at the most fundamental level, in terms of electromagnetic response. The Mattis-Bardeen theory for conventional superconductors becomes inadequate near the disorder-tuned SIT, where phase fluctuations become important. We present AC conductivity results obtained using determinant quantum Monte Carlo simulations, which include both quantum and thermal phase fluctuations. We find unexpected low-energy weight in the AC conductivity especially near the SIT, and we identify possible sources of this weight. We comment on implications for experiments [1,2].

[1] R. Valdés Aguilar et al., Phys. Rev. B 82, 180514 (2010)

[2] I. Hetel et al., Nature Physics 3, 700-702 (2007)

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