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Dynamical conductivity across the superconductor-insulator transition MASON SWANSON, The Ohio State University, YEN LEE LOH, The University of North Dakota, MOHIT RANDERIA, NANDINI TRIVEDI, The Ohio State University — Thin superconducting films can exhibit a quantum phase transition from a superconductor to an insulator with increasing disorder. While the exact mechanism of the transition is not completely understood, there is strong evidence that it is bosonic in nature in some models and materials, with disorder acting to localize the superconducting pairs [1]. Previous studies of bosonic models of the superconductor-insulator transition (SIT) have focused almost entirely on criticality and dc properties at the transition. We go beyond these studies by calculating the dynamical conductivity of a disordered (2+1)D XY model using quantum Monte Carlo simulations that capture the phase fluctuations driving the SIT. Our results obey standard sum rule constraints for the longitudinal and transverse current correlation functions and show a build-up of integrated spectral weight near the transition. We will discuss the low frequency spectral weight in terms of a possible intermediate bose-metal phase between the superconductor and insulator. [1] K. Bouadim, Y. L. Loh, M. Randeria, and N. Trivedi, *Nat. Phys.* **7**, 884 – 889 (2011). We acknowledge support from the NSF Graduate Research Fellowship Program (MS), NSF DMR-1006532 (MR), and DOE DE-FG02-07ER46423 (NT).

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