

THE BATSHEVA DE ROTHSCHILD SEMINAR ON TOPOLOGY MEETS DISORDER AND INTERACTIONS: **PRESENT CHALLENGES, FUTURE PROMISES** 27-31 MAY, 2018

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Finite Temperature Insulator Transition in a Strongly Disordered Superconductor: Nonergodicity and Vogel-Fulcher-Tammann Behavior

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Strongly disordered superconducting films have been observed to undergo finite temperature transitions to a superinsulating state, of apparently infinite resistance, mirroring superconductivity. Approaching the transition, some of the films reportedly exhibit Berezinskii-Kosterlitz-Thouless (BKT) criticality implying that superinsulation is associated with an ordered charge BKT phase. An even more singular Vogel-Fulcher-Tammann (VFT) criticality has also been seen, positing the question of the existence of fundamentally different states of finite temperature insulators. We develop a theory of the criticality of a disordered lateral Josephson junction array with weak Josephson coupling. We show that it is equivalent to a two-dimensional Coulomb gas subject to a random potential with logarithmic correlations. We show that strong disorder results in a regime exhibiting VFT criticality instead of the usual BKT one, and find that it corresponds to transition to a nonergodic insulator phase.