

Abstract Submitted
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Quenched singularity in the density of states of 2D random hydrogenic systems¹ R.N. BHATT, Department of Electrical Engineering, Princeton University; Princeton Center for Theoretical Physics, Princeton, NJ 08544, ERIK NIELSEN, Department of Electrical Engineering, Princeton University, Princeton, NJ 08544, JAYSON PAULOSE, Department of Physics, Harvard University, Cambridge, MA 02138 — Delta-doped hydrogenic dopants in semiconductor heterostructures give rise to an impurity band which can be characterized by a two-dimensional tight-binding model with randomly positioned sites. At low densities, the density of states possesses a singularity about the impurity level, which can be understood in terms of the states of a hierarchically constructed set of impurity pairs. As the density is raised, this singularity is quenched due to further neighbors breaking the electron-hole symmetry. The quenching is accompanied by an asymmetry in the density of states, and pair approximations are insufficient to even qualitatively describe the system at higher densities. We motivate and outline a renormalization group technique that captures the quenched singularity and asymmetry in the density of states. This approach motivates the study of random bipartite systems [1], for which it is particularly suited. We compare the results of both types of systems. [1] M. Inui, S. A. Trugman, and Elihu Abrahams, Phys. Rev. B 49, 3190 (1994).

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