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Extended States and Critical Behavior in 2D and 3D Amorphous Conductors DONALD PRIOUR, Kansas City, Kansas Community College (KCKCC) — With a tight binding treatment for one, two and three dimensional systems, we calculate and analyze electronic states in a conductor with topological disorder, or no correlations among the positions of the hopping sites. The Inverse Participation Ratio (IPR) is used to characterize carrier wave functions with respect to localization. We consider an exponentially decaying hopping integral with range (or "Bohr radius") l. Using two complementary finite size scaling techniques to extrapolate to the bulk limit (both methods exploit critical behavior in different ways to locate the energy marking the boundary between extended and localized wave functions) which nevertheless yield identical results, we obtain phase diagrams showing regions where states are extended and domains of localized states. We find exclusively localized wave functions for 1D geometries, irrespective of l. In the 2D case, states are localized below a threshold length scale $l_c \approx 1.0$, with a finite fraction of states extended for $l > l_c$. For 3D systems, the extended phase is flanked by regions of localized states and bounded by two mobility edges. The swath of extended states, broad for $l \sim 1$, becomes narrower with decreasing l, scaling asymptotically as $e^{-A/l}$ for $l \ll 1$.

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