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Critical exponents of the three-dimensional Anderson transition from multifractal analysis ALBERTO RODRIGUEZ, LOUELLA VASQUEZ, Department of Physics and Centre for Scientific Computing, University of Warwick, Coventry, CV4 7AL, United Kingdom, KEITH SLEVIN, Department of Physics, Graduate School of Science, Osaka University, 1-1 Machikaneyama, Toyonaka, Osaka 560-043, Japan, RUDOLF ROEMER, Department of Physics and Centre for Scientific Computing, University of Warwick, Coventry, CV4 7AL, United Kingdom
— We use high-precision, large system-size wave function data to analyse the scaling properties of the multifractal spectra around the disorder-induced three-dimensional Anderson transtion in order to extract the critical exponent ν of the localisation length. We study the scaling law around the critical point of the generalized inverse participation ratios $P_q = \langle |\Psi_i|^2 \rangle$ and the singularity exponent α_0, defined as the position of the maximum of the multifractal spectra, as functions of the degree of disorder W, the system size L and the box-size ℓ used to coarse-grained the wave function amplitudes. The values of α_0 are calculated using a new method entirely based on the statistics of the wave function intensities [Phys. Rev. Lett. 102, 106406 (2009)]. Using finite size scaling analysis we find agreement with the values of ν obtained from transfer matrix calculations.

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