Anomally Localized States at the Anderson Transition
HIDEAKI OBUSE, Condensed Matter Theory Laboratory, RIKEN, Wako, Saitama
351-0198, Japan, KOUSUKE YAKUBO, Department of Applied Physics, Graduate
School of Engineering, Hokkaido University, Sapporo 060-8628, Japan — Anoma-
lously localized states (ALS) at the critical point of the disorder induced metal-
insulator transition, namely, the Anderson transition, are investigated. ALS are
states in which most of amplitudes of a wave function concentrate on a narrow
spatial region even in a metallic phase. While the existence of ALS in the metal-
lic phase was analytically predicted and confirmed by numerical and experimental
works, ALS at the critical point are far from understood due to lack of proper analyt-
ical methods describing critical phenomena of this phase transition. In this work, it
is numerically shown that ALS exist at the critical point of the Anderson transition
in both the three-dimensional orthogonal class and the two-dimensional symplectic
class by quantifying non-multifractality of critical wave functions due to a charac-
teristic length originating in their concentration nature of ALS. These results may
suggest that the existence of non-multifractal states at criticality is generic in many
disordered systems.

Hideaki Obuse
Condensed Matter Theory Laboratory, RIKEN, Wako, Saitama 351-0198, Japan

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