

凝縮系物理学ゼミナール

日時：6月23日（水）13：30～

場所：理学部5号館 413号室

講演者：Dr. Hideaki Obuse 氏
(Condensed Matter Theory Group)

「Conformal Invariance and Multifractality at Localization-Delocalization Transitions in 2D Disordered Electron Systems」

Localization-delocalization or Anderson localization transitions of non-interacting electrons are continuous phase transitions driven by disorder. At the Anderson transition point, wave function amplitudes obey scale-invariant, multifractal statistics. In this work, we investigate conformal invariance and multifractality at the Anderson transition in two-dimensions (2D).

At the first part of the talk, we derive universal relations connecting bulk and boundary multifractality in 2D to the localization lengths in the quasi-one dimensional (Q1D) systems imposed periodic and reflecting boundary conditions by using conformal invariance. We numerically verify the relations for various Anderson transitions in 2D.

Next, we investigate multifractality of the conductance at the integer quantum Hall transition in 2D. We show that exponents obtained from the point-contact conductance for the bulk and the reflecting boundary are related to the bulk and reflecting boundary multifractality, respectively. We also consider IQH systems with dissipation and show that these systems are characterized by different multifractality from the current conserved system. Finally, we confirm that these properties are preserved for the two-terminal conductance in the Q1D due to conformal invariance. Our results provide a way to observe multifractality by the actual experimental setup.