



Condensed Matter Seminar

物性論セミナー

Supported by Variety and universality of bulk-edge correspondence in topological phases: From solid state physics to transdisciplinary concepts
Grant-in-Aid for Scientific Research (S) Project No.17H06138

2018年9月26日 (水), Sep 26 (Wed), 2018, 13:30-14:30

自然系学系棟B棟6階: 602号室

[\[地図\]](#)

Quantum many-body physics in open systems: measurement and strong correlations

Yuto Ashida

Department of Physics, University of Tokyo

Realizations of quantum gas microscopy have offered novel possibilities to measure quantum many-body systems at the single-particle level [1]. Further developments could allow us to perform continuous monitoring of the many-body system [2,3]. In the first part of the talk, I discuss the influence of the measurement backaction on quantum criticality due to continuous observation. Analyzing an effective non-Hermitian Hamiltonian, we show that the measurement backaction can trigger (i) the bifurcation of critical exponents in Tomonaga-Luttinger liquid [4] and (ii) a new universality class of critical phenomena that has no counterpart in closed systems [5]. In the second part, I discuss the propagation of correlations under the measurement backaction [6]. We analyze the density matrix projected on the subspace containing a specific number of quantum jumps and find that there appear supersonic modes propagating beyond the generalized Lieb-Robinson bound. If possible, I will also talk about our recent work on thermalization and heating dynamics of open nonintegrable many-body systems [7].

[1] W. S. Bakr et al., Nature 462, 74-77 (2009).

[2] Y. A. Patil et al., PRL 115, 140402 (2015).

[3] YA and M. Ueda, PRL 115, 095301 (2015).

[4] YA, S. Furukawa, and M. Ueda, PRA 94, 053615 (2016).

[5] YA, S. Furukawa, and M. Ueda, Nat. Commun. 8, 15791 (2017).

[6] YA and M. Ueda, PRL 120, 185301 (2018).

[7] YA, K. Saito and M. Ueda, arXiv:1807.00019.

Contact : T. Yoshida 吉田恒也 Tel:029-853-4535

Email: yoshida@rhodia.ph.tsukuba.ac.jp