

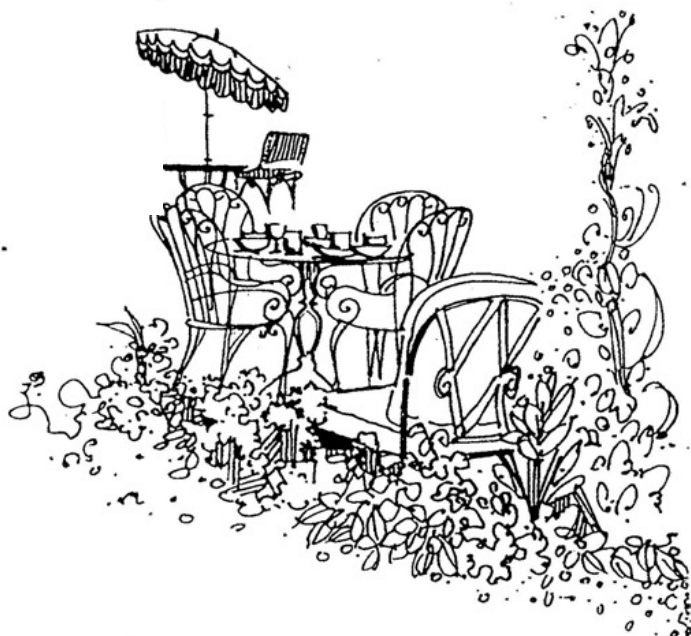
Chez Pierre

Presents ...

Thursday, October 8, 2026

11:00 am- 12: 00 pm

Duboc room - 4-331



Special Chez Pierre Seminar

Hiroki Isobe, Kyushu University

"Hidden physics in nonlinear transport: from surface symmetry breaking to quantum Hall states"

Abstract: Nonlinear transport can reveal electronic phenomena that remain hidden in conventional linear response. In this talk, I discuss two examples in which nonlinear responses expose physics associated with symmetry reduction, interactions, and collective dynamics.

First, I consider the surface photogalvanic effect in centrosymmetric crystals. Although inversion symmetry forbids the photogalvanic effect in the bulk, surface termination lowers the symmetry and can activate photocurrent responses absent in the bulk. I present a symmetry-based framework for classifying these surface responses [1], motivated by an observation in Ag_2Te .

Second, I discuss the recently observed third-order Hall response in the quantum Hall regime, where the linear Hall resistance remains quantized. I present two complementary explanations based on interactions between edge channels [2] and hydrodynamic bulk transport in inhomogeneous electric fields [3]. These examples illustrate how nonlinear response can uncover hidden symmetry and dynamics in quantum materials.

[1] Y. Furusho and H. Isobe, in preparation.

[2] H. Isobe and N. Nagaosa, *Sci. Adv.* 10, eado2704 (2024).

[3] H. Isobe, *Newton* 2, 100466 (2026).