



# 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  
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10:30-11:30

自然系学系棟B棟6階: 602号室

[\[地図\]](#)

### Topology of effective evolutions: oriented scattering networks and the phase rotation symmetry

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Crucial features of wave propagation in (meta)materials can be captured by effective evolutions, which focus on the relevant degrees of freedom. Scattering networks are an example of such effective descriptions, where the evolution, discrete both in time and space, consists of scattering processes at the nodes of a graph. When the successive scattering events follow a cyclic sequence, the corresponding scattering network can be equivalently described by a discrete time-periodic unitary evolution, in line with Floquet systems. Such systems may present anomalous topological phases where all the first Chern numbers are vanishing, but where protected edge states appear in a finite geometry. To investigate the origin of such anomalous phases, we introduce the phase rotation symmetry, a generalization of usual symmetries which only occurs in unitary systems (as opposed to Hamiltonian systems). This new tool allows to define bulk invariants which fully capture the topology of the system, and to explore peculiar features of network models.

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