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VISITING PROGRAM

# TSVP TALK

## Arrow of Time in Quantum Mechanics

2025  
THU. **Aug. 21**

**15:00–16:00**

**HYBRID**

L5D23, ZOOM



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Why does the time flow only in one particular direction? This is a fundamental question of physics, called the problem of "the arrow of time." There are a few types of the arrow of time. The cosmological arrow of time refers to the expansion of our universe as we see it. The psychological arrow of time refers to the direction of time that we perceive. The arrow of time that I am going to discuss in this talk is the dynamical arrow of time, which refers to the following problem. The fundamental equations of motion, namely the Newton equation for classical mechanics and the Schrödinger equation for quantum mechanics, are symmetric if we flip the arrow of time. Nonetheless, we see the oscillation of a pendulum always diminishes, and an excited state always decays into the ground state. How can this inconsistency arise? There have been many answers to it but most of them attribute the reason to the limitation of our ability of measuring physical systems. That almost sounds like the dynamical arrow of time could be flipped or eliminated if we have more abilities! We answer the question as follows...

The University of Tokyo

## Naomichi Hatano

Naomichi Hatano is a professor at U. Tokyo, working on fundamental aspects of statistical and quantum physics. He is best known as one of the initiators of non-Hermitian quantum mechanics for his proposal of a model called the Hatano-Nelson model back in 1990s. He has recently worked on non-Hermiticity of open quantum systems and now is delving into their non-Markovian dynamics.

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