Beitrag ID: **23** Typ: **Talk**

From Ising to QCD: Phases, symmetry, and AI

Donnerstag, 13. November 2025 10:00 (30 Minuten)

At the centennial of quantum mechanics, I will survey the interface of AI × quantum physics with symmetry as the guiding theme. First, I will present work on the Ising model, which also marks its centennial, showing in the two-dimensional case that a convolutional neural network can extract phase transition signals and estimate the critical point without prior knowledge of the order parameter. Next, I will briefly touch on applications that use a Transformer with equivariant attention to semiclassical spin-fermion systems. Finally, I will introduce an extension toward quantum chromodynamics: a gauge-covariant Transformer, CASK, and design principles consistent with gauge symmetry. Building on these elements, I will discuss the horizons that AI × quantum physics can open on next-generation supercomputers.

Vortragende(r): TOMIYA, Akio (Tokyo Woman's Christian University)

Sitzung Einordnung: Plenary