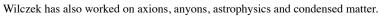# SPECIAL TALKS

Frank Wilczek: Floquet Time Crystals

Monday November 29, 16:00

In recent years spontaneous breaking of discrete time translation symmetry has become a fertile area of theoretical, experimental and computational research. New, dynamic states of matter have been discovered, that challenge traditional ideas about the nature of thermal equilibrium. I will give an overview of this work, and then suggest possible future directions and applications.

Aud A (online presentation), Link to talk:

Frank Wilczek is affiliated with MIT, Nordita/Stockholm University, Arizona State University and the Tsung-Dao Lee Institute in Shanghai. He was awarded the Nobel Prize in 2004 for "asymptotic freedom", together with D. Gross and H. D. Politzer. This discovery (1971) paved the way for QCD, the theory of strong interactions.

Wilczek has also worked on axions, anyons, astrophysics and condensed matter.

Gerard 't Hooft:
Discreteness and Determinism in Quantum Mechanics

Aud A, Wednesday December 1, 14:30

Quantum mechanics is usually considered to be a theory based on indeterminism. Here we show that its mathematics actually suggests a completely deterministic underlying theory. This requires evolution operators that describe discretised jumps in space and time. To understand how the known elementary particles, arranged in the Standard Model, can be reconciled with this picture, the discrete and continuous symmetries must be understood. This could open new avenues towards model building.

We also briefly discuss the implications regarding Bell's theorem.

Link to talk:

Gerard 't Hooft is professor at the Utrecht University. He shared the 1999 Nobel Prize with M. J.G. Veltman "for elucidating the quantum structure of electroweak interactions", paving the way for quantitative predictions within the theory describing weak interactions and culminating with the discovery of the Higgs boson.

't Hooft has also worked on general aspects of gauge theory, black holes and quantum gravity