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INSTITUTSKOLLOQUIUM

Gemeinsames Kolloquium der Physik und Chemie

Am Dienstag, dem **24. November 2026**, spricht um **17:15 Uhr** im **Faraday-Hörsaal,**

Dr. Joanne Hizanidis

Institute of Electronic Structure and Laser,
FORTH Heraklion, Griechenland

zum Thema:

"Neuromorphic Computing with Josephson Junctions"

Abstract:

Neuromorphic computing is a rapidly advancing field inspired by neuroscience, aiming to develop powerful algorithms, energy-efficient hardware, and new insights into cognition. Broadly, it encompasses two main directions: one focused on devices that emulate the dynamics of biological neurons and synapses, and another that exploits physical systems as computational substrates for machine learning. Both directions are discussed here in the context of superconducting implementations based on Josephson junctions. Superconductor-based neuromorphic systems are particularly attractive because they combine ultrafast operation, approaching terahertz frequencies, with extremely low, and in some cases negligible, power dissipation. Josephson junctions are inherently neuromorphic hardware devices, capable of exhibiting spiking behavior and excitability. In the first part of this presentation, we introduce mathematical models of Josephson-junction circuits that emulate neuronal dynamics from a nonlinear-dynamics perspective. In the second part, we explore how Josephson junctions can serve as physical substrates for machine learning, focusing on reservoir computing applications.

Wir laden Sie zu diesem Kolloquium herzlich ein!

Die Hochschullehrer der Institute für Physik und Chemie