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# Physics Colloquium
# TU Wien

27. February 2024
16:15
Freihaus,
Nöbauer Hörsaal (HS8)
Wiedner Hauptstraße 8-10

# COLLOQUIUM LECTURE ON THE NOBEL PRIZE IN PHYSICS 2024

## Physical Learning Machines

**Florian Marquardt**

**Max Planck Institute for the Science of Light, Friedrich-Alexander-Universität Erlangen-Nürnberg**

Machine learning and artificial intelligence are revolutionizing science and technology. However, the ever-increasing resource requirements for training powerful deep neural networks, such as large-language models, are on an unsustainable trajectory. For this reason, a community of researchers is urgently looking for alternatives to digital neural networks: physics-based hardware platforms that can be trained just like neural networks but that are potentially much more energy-efficient. In this talk, I will focus on our ideas for the physics-based training of such learning machines.
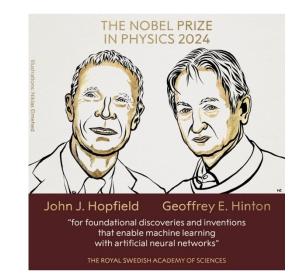
A buffet will be offered at 15:45



**Prof. Florian Marquardt** studied physics in Bayreuth. In 2002, he defended his PhD thesis at the university of Basel, Switzerland. From there he moved to Yale University, USA, where he was a postdoctoral fellow (2003-2005). Returning to Germany in 2005, he became a junior professor and Emmy-Noether group leader at the Ludwig-Maximilians University Munich. Having been appointed to full professor in 2010 at the Friedrich-Alexander University Erlangen-Nuremberg, he joined the Max Planck Institute for the Science of Light (MPL) as a director as of August 2016.Prof. Dr. Florian Marquardt is director and scientific member at the Max Planck Institute for the Science of Light, Erlangen



THE NOBEL PRIZE IN PHYSICS 2024

John J. Hopfield    Geoffrey E. Hinton

"for foundational discoveries and inventions that enable machine learning with artificial neural networks"

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