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Physics Colloquium

TU Wien

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Applications of Machine Learning and Neural Networks to Quantum Systems

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Applications of learning algorithms using deep neural networks have developed considerably recently, often with spectacular results. The physics of complex quantum systems is no exception, with multiple applications that constitute a new field of research. Examples include the representation and optimization of wave functions of quantum systems with large numbers of degrees of freedom (neural quantum states), the determination of wave functions from measurements (quantum tomography), and applications to the electronic structure of materials, such as the determination of more precise density functionals or the learning of force fields to accelerate molecular dynamics simulations. I will survey some of these applications, with an emphasis on neural quantum states.

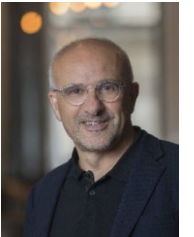
VERANSTALTUNGSORT

TU Wien, Freihaus,
Hörsaal 8, gelber Bereich, 2. Stock
Wiedner Hauptstraße 8-10
1040 Wien

VERANSTALTUNGSZEIT

16:00 Uhr c.t.

Ab 15:45 wird es ein Buffet geben.



Antoine Georges is a professor of physics at the Collège de France, where he holds the chair in condensed matter physics. He also has joint appointments with École Polytechnique and the University of Geneva. He received his Ph.D. from the École Normale Supérieure in 1988. His early research concerned the statistical mechanics of disordered systems, but his main focus has been on the physics of quantum materials with strong electron-electron interactions. These materials possess remarkable electronic properties and functionalities. Georges is one of the inventors of dynamical mean field theory, for which he shared the 2006 Europhysics Prize. This theory has deeply transformed our understanding of these materials and our ability to explain, calculate and predict their physical properties. In recent years, Georges has made contributions linking condensed matter physics and quantum optics and has also contributed to the field of ultra-cold atomic gases. Georges received the 2007 Silver Medal from the National Center for Scientific Research (CNRS) and was awarded a Synergy grant from the European Research Council.

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