

Advancing Quantum Mechanics with Mathematics and Statistics Tutorials

Tuesday March 8, 2022

- 8:00–9:00 *Check-In/Light Breakfast (Hosted by IPAM)*
- 9:00–10:15 **Kieron Burke** (University of California, Irvine (UCI))
Elements of electronic structure calculations: HF and DFT
- 10:15–10:45 *Break*
- 10:45–12:00 **Jianfeng Lu** (Duke University)
Virtual Talk:
- 12:00–12:30 *IPAM Orientation*
- 12:30–2:00 *Lunch (on your own)*
- 2:00–3:15 **Alexandre Tkatchenko** (University of Luxembourg)
Wavefunction-based approaches and perturbation theory: Physics Perspective
- 3:15–3:45 *Break*
- 3:45–5:00 **Prineha Narang** (Harvard University)
Virtual Talk: Ab initio quantum chemistry approaches to nonequilibrium interactions in molecules and materials

Wednesday March 9, 2022

- 9:00–10:15 **Robert Webber** (California Institute of Technology)
Randomized methods for quantum many-body problems: a mathematical primer
- 10:15–10:45 *Break*
- 10:45–12:00 **David Ceperley** (University of Illinois at Urbana-Champaign)
Virtual Talk: Introduction to Classical and Quantum Monte Carlo methods for Many-Body systems
- 12:15–2:00 *Lunch (on your own)*
- 2:00–3:15 **Dominika Zgid**
Virtual Talk: A physical/chemical motivation behind quantum embedding theories
- 3:15–3:45 *Break*
- 3:45–5:00 **Lin Lin** (University of California, Berkeley (UC Berkeley))
A mathematical introduction to quantum embedding theory



Thursday March 10, 2022

- 9:00–10:15 **Stefan Chmiela** (Technische Universität Berlin)
Machine learning basics: A speedrun
- 10:15–10:45 *Break*
- 10:45–12:00 **Michael Lindsey** (New York University)
Many-body perturbation theory and Green's function methods
- 12:15–2:00 *Lunch (on your own)*
- 2:00–3:15 **Benjamin Stamm** (RWTH Aachen University)
Virtual Talk: Eigenvalue problems and error control
- 3:15–3:45 *Break*
- 3:45–5:00 **Matteo Gori** (University of Luxembourg)
Field theory methods for multiscale description of quantum systems

Friday March 11, 2022

- 9:00–10:15 **Laura Grigori** (Sorbonne Université)
Virtual Talk: Math: Large scale linear algebra through randomization and communication avoiding techniques
- 10:15–10:45 *Break*
- 10:45–12:00 *Alexandre Tkatchenko: The Theory of Molecular Interactions*
- 12:15–2:00 *Lunch (on your own)*

