

# Building the second quantum revolution by training Schrödinger cats, from very fat to very fast



## Tommaso Calarco

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**Join Virtually: <https://uchicago.zoom.us/j/92621985509>**

**Passcode: 599763**

Developing quantum technologies towards practical application requires exquisite control of the dynamics of multiqubit systems. Quantum optimal control offers a natural, and increasingly widespread, way to achieve this to the maximum possible extent. I will introduce the optimal control method we developed for quantum many-body systems and its remote closed-loop implementation RedCRAB, and I will report recent results we obtained with it in various physical contexts from diamond color centres to atoms in optical trap arrays, where we demonstrated optimal preparation of a 20-qubit GHZ state as well as single-atom spatial superposition states at the quantum speed limit. I will also put these specific efforts in the more global context of the European Quantum Technologies activities, including recent developments towards scientific cooperation with the US.

*Tommaso Calarco has pioneered the application of quantum optimal control methods to quantum computation and to many-body quantum systems. Currently the Director of the Institute for Quantum Control of the Peter Grünberg Institute at Forschungszentrum Jülich, Tommaso received his PhD at the University of Ferrara and started to work as a postdoc in the group of P. Zoller at the University of Innsbruck. He was appointed as a Senior Researcher at the BEC Centre in Trento in 2004 and as a Professor for Physics at the University of Ulm in 2007, where he then became Director of the Institute for Complex Quantum Systems and of the Centre for Integrated Quantum Science and Technology. He has authored in 2016 the Quantum Manifesto, which initiated the European Commission's Quantum Flagship initiative, and is currently the Chairman of one of the Flagship's Governing Bodies: The Quantum Community Network.*

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