

Is the world on the brink of a computing revolution? – Quantum computing at the 5th Heidelberg Laureate Forum

by Manjil Saikia - Thursday, August 31, 2017

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[Press Release]

Panel of experts will address the practical applications of quantum computing and what could impede its development.

Rapid development in quantum computing over the past few years has brought it from an exotic theoretical possibility to a technology with tangible prototypes. Its ultimate potential is hard to assess, but some researchers expect it to be revolutionary in terms of what it will do for the complexity of problems computing can address. On September 28, 2017, a collective of theorists and experimentalists will take the stage for this Hot Topic of the 5th Heidelberg Laureate Forum (HLF), September 24-29. A panel of experts will guide the session through the theoretical and algorithmic obstacles of quantum computing and into the present status and realistic future prospects.

Quantum computing is so radically faster than standard computation that it could transform computing as we know it. But only if it is able to realize its theoretical potential. There are fundamental and practical roadblocks still to overcome: stabilizing qubits (quantum bits) enough to compute with them dependably and in large enough numbers, designing quantum algorithms that can execute valuable tasks and deal with errors, and theoretical complications that go to the heart of quantum theory itself. Despite these challenges, immense progress has been and will continue to be made by research at academic centers and companies such as IBM and Google.

The Hot Topic has been coordinated and will be moderated by **Philip Ball**, a science writer and author, and a former editor for physical sciences at Nature. His next book, to be published in 2018, is an examination of current views on the interpretation of quantum mechanics. Ball has brought together leading researchers in the field from various backgrounds: theorists tackling the fundamental principles of quantum computing and algorithmic development, and experimental physicists and engineers who work to implement these ideas. The panelists will debate which expectations are realistic for quantum computers in the near future, what major obstacles still stand in the way – and where the opportunities lie for young researchers looking for ways into this exciting field.

Panelists:

Scott Aaronson is David J. Bruton Centennial Professor of Computer Science at the University of Texas at Austin, USA. His research interests include quantum computing and theoretical computer science more broadly. He writes the influential blog “Shtetl-Optimized”.

Jay Gambetta is Manager of the Theory of Quantum Computing and Information Section at IBM’s

Thomas J. Watson Research Center, Yorktown Heights, New York, USA.

Seth Lloyd is a self-styled “quantum mechanic”, and a Nam Pyo Suh Professor at the Department of Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA.

John Martinis is a Professor of Physics at University of California at Santa Barbara, and a Research Scientist at the Google Quantum AI Laboratory, where he is head of the quantum hardware team whose goal is to build a useful quantum computer.

Christopher Monroe is a Distinguished University Professor and Zorn Professor of Physics at the University of Maryland, USA, and co-Founder and Chief Scientist at IonQ, Inc. He is a leading researcher in the use of individual atoms for realizing quantum computers and quantum simulators. He has also pioneered modular architectures for scaling up atomic quantum computers using photonic networks.

The Hot Topic is an integral part of the Heidelberg Laureate Forum (HLF), a networking event where talented young researchers from all over the world meet the recipients of the most renowned awards in computer science and mathematics: the Abel Prize, ACM A.M. Turing Award, ACM Prize in Computing, Fields Medal and the Nevanlinna Prize. The Hot Topic will be held on September 28, at 11:30 in the New Auditorium of Heidelberg University, Grabengasse, 69117 Heidelberg. Though the HLF is by invitation only, video coverage of the Hot Topic will be made available on the HLF YouTube channel and the video archive.

Background

The Heidelberg Laureate Forum Foundation (HLFF) annually organizes the Heidelberg Laureate Forum (HLF), which is a cross-generational networking event for mathematicians and computer scientists from all over the world. The 5th Heidelberg Laureate Forum will take place from September 24–29, 2017. The HLFF was established and is funded by the German foundation Klaus Tschira Stiftung (KTS), which promotes natural sciences, mathematics and computer science. The Scientific Partners of the HLFF are the Heidelberg Institute for Theoretical Studies (HITS) and Heidelberg University. The HLF is strongly supported by the award-granting institutions, the Association for Computing Machinery (ACM), the International Mathematical Union (IMU), and the Norwegian Academy of Science and Letters (DNVA).

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