

QST↔HEP Intersections

Afternoon Plenary: HEP/Quantum Science and Technology (QST) Intersections

130 (Kane Hall)

Conveners: Maria Spiropulu (Caltech), Martin Savage (INT, UW)



5:30 PM

HEP/QST Landscape The landscape of QST/HEP intersections across academic/research institutions, including national and international laboratories and industry. **Speaker: Joseph Lykken** (Fermilab)

5:45 PM

HEP & the language of entanglement Quantum entanglement advancing HEP theory, experiment, and computation. Examples drawn from black holes and radiation. **Speaker: Geoffrey Penington** (IAS/Princeton)

6:00 PM

National Quantum Initiative (NQI): 2018 - now The status of the National Quantum Initiative launched by the DOE and other federal agencies in 2018. **Speaker: Paul Dabbar** (Columbia/BQT)

6:10 PM

Panel Discussion The panel will debate the status and envision the future of QST/HEP intersections and highlight the integration of quantum science and technology developments with the HEP apparatus, including building a quantum-ready workforce. Topics that will be discussed include: 1) Codesign quantum experiments to advance and be advanced by the HEP mission as exemplified by the ongoing dark sector searches as well as other quantum gravity type of probes in AMO experiments in collaboration with HEP/QIS theorists. 2) The role of NQI centers and QC testbeds including SQMS for example, in advancing the HEP mission on fundamental physics while at the same time advancing Quantum Information Science and Technology systems at large. Status and achievements to-date, challenges and prospects as well as capability building. 3) The integration of Quantum Computing (hardware, software, hybrid architectures) into the laboratory, academic, research computing ecosystem. 4) Status and progress of quantum operating systems and architectures, and the growing partnerships between tech companies and researchers in HEP toward advancing the fundamental physics mission. How the HEP user-based scientific community can help tech companies by providing benchmarking and users of the quantum computing infrastructure. 5) Status and future of Quantum Simulations in HEP, the role and applications of AI/QML in HEP and HEP theoretical or experimental challenges and research that can advance quantum computing and QML tools. **Speakers: Aaron Chou** (Fermilab), **Anna Grassellino** (Fermilab), **Christian Bauer** (LBNL), **Krysta Svore** (Microsoft), **Monika Schleier-Smith** (Stanford), **Paul Dabbar** (Columbia & BQT), **Ravi Naik** (Berkeley/LBNL), **Shinjee Yoo** (BNL), **Travis Humble** (Oak Ridge National Laboratory)

7:00 PM

Closing Remarks The role and impact of fundamental science, specifically HEP, on the present and future quantum ecosystem. **Speaker: Carl Williams**



Community Summer Study

SN  WMASS

July 17-26 2022, Seattle

JULY 23, 2022



QST \leftrightarrow HEP Intersections July 23, 2022

Aaron Chou: Head QSC devices/sensors, QuantiSED PI, Fermilab, PhD 2002 (Stanford University)

Aнна Grassellino: Director SQMS, Fermilab, PhD 2011 (University of Pennsylvania) Presidential Early Career Award (2017)

Carl Williams: President/CEO, CJW Quantum Consulting, NIST/QED-C co-founder, PhD 1987 (University of Chicago)

Christian Bauer: Head Theory LBNL, PhD 2000 (University of Toronto)

Geoff Penington: Visiting Professor (IAS), Professor of Physics (Berkeley), PhD 2020 (Stanford University) New Horizons in Physics Prize (2021)

Joe Lykken: Deputy Director for Research, Head Fermilab Quantum Institute, PhD 1982 (MIT)

Krysta Svore: Head Azure Quantum Research, Microsoft Research, PhD 2006 (Columbia University)

Maria Spiropulu: Shang-Yi Ch'en Professor of Physics, Caltech, PhD 2001 (Harvard University)

Martin Savage: Professor of Physics, Senior Fellow at the INT, InQubator for Quantum Simulation PI, PhD 1990 (Caltech)

Monika Schleier-Smith: Professor of Physics, Stanford, PhD 2011 (MIT) MacArthur Fellow (2020)

Paul Dabbar: Distinguished Visiting Fellow, Columbia University, CEO BQT, DOE Undersecretary for Science (2017-21)

Ravi Naik: Head of Measurement, Advanced Quantum Testbed, Berkeley/LBNL, PhD 2018 (University of Chicago)

Shinjae Yoo: Lead AI/QML, BNL, PhD 2010 (Carnegie Mellon)

Travis Humble: Director QSC, ORNL, PhD 2005 (University of Oregon)

