Quantum information processing aims to leverage the properties of quantum mechanics to manipulate information in ways that are not otherwise possible. This would enable, for example, quantum computers that could solve certain problems exponentially faster than a conventional supercomputer. One promising approach for building such a machine is to use gated silicon quantum dots. In the approach taken at HRL Laboratories, individual electrons are trapped in a gated potential well at the barrier of a Si/SiGe heterostructure. Spins on these electrons are compelling candidates for qubits due to their long coherence times, all-electrical control, and compatibility with conventional fabrication techniques. In this talk, I will discuss our recent demonstrations of automated tune-up of a six-dot Si device into a configuration suitable for high-fidelity, randomized benchmarking of exchange-only qubits.

Bio: Edward H. Chen is a research scientist in the Materials and Microsystems Laboratory at HRL Laboratories working on the development of solid-state devices for computation, navigation, communication and sensing applications. He received his PhD in Electrical Engineering and Computer Science from MIT specializing in the field of quantum photonics and sensing supported by NASA as a Space Technology Research Fellow.

References:
3. SM Meenehan (HRL). APS March Meeting, X34.00004 (2019)