Contribution ID: **10** Type: **not specified**

Creating Correlated Errors on Transmon Qubits Using an Electron Linear Accelerator

Superconducting transmon qubits are known to be susceptible to errors due to ionizing radiation from ambient radioactive decay and cosmic ray sources (muons). Here, we use a ~22 MeV electron linear accelerator (linac) as an on-demand high-energy particle source to study deleterious effects on a multi-qubit transmon system. The linac provides a pulsed, microsecond burst of radiation that can be redirected at our dilution refrigerator to cause qubit errors. We show that the radiation-induced error dynamics of individual qubits, and the system as a whole, can be easily and quickly extracted due to the on-demand nature of our radiation source and rapid few-microsecond qubit measurement cycle. We present differences in error dynamics due to qubit design and state preparation. We also outline how our experimental configuration should accurately mimic the energy deposition from a typical cosmic-ray muon. This testbed provides a useful tool for the investigation of novel qubit design and packaging techniques for the mitigation of radiation-induced errors.

Primary authors: Dr MCJUNKIN, Thomas (JHU Applied Physics Laboratory); Dr HUNT, Alan W (JHU Applied Physics Laboratory); Dr HAARD, Thomas M (JHU Applied Physics Laboratory); Dr JONES-ALBERTY, Yenuel (JHU Applied Physics Laboratory); Mr SPEAR, Matthew K (JHU Applied Physics Laboratory); Dr SCHULTZ, Kevin M (JHU Applied Physics Laboratory)

Session Classification: Poster Session