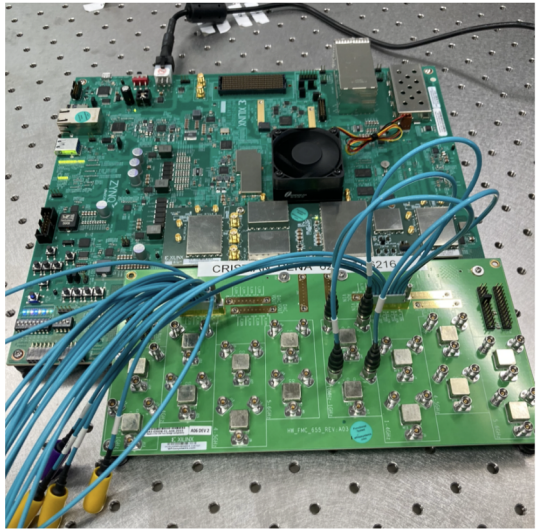
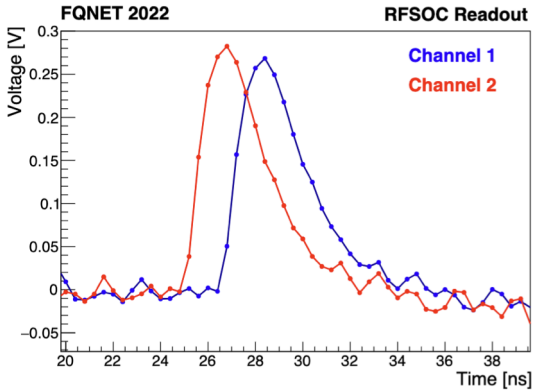
QICK SNSPD Readout Demonstrator

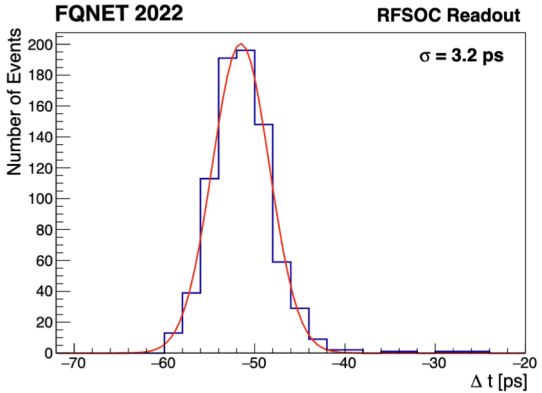
- SNSPDs are ideal low-threshold photodetectors for axion detection experiments (see talk by C.Pena)
- **Quantum Instrumentation Control Kit** System offers integrated solution to FPGA-based detector control and readout
- First demo of time-domain readout of SNSPDs sampled at 2.5Gsps, measured sync time resolution of 3ps

- **Paving the way towards fast and scalable readout !**



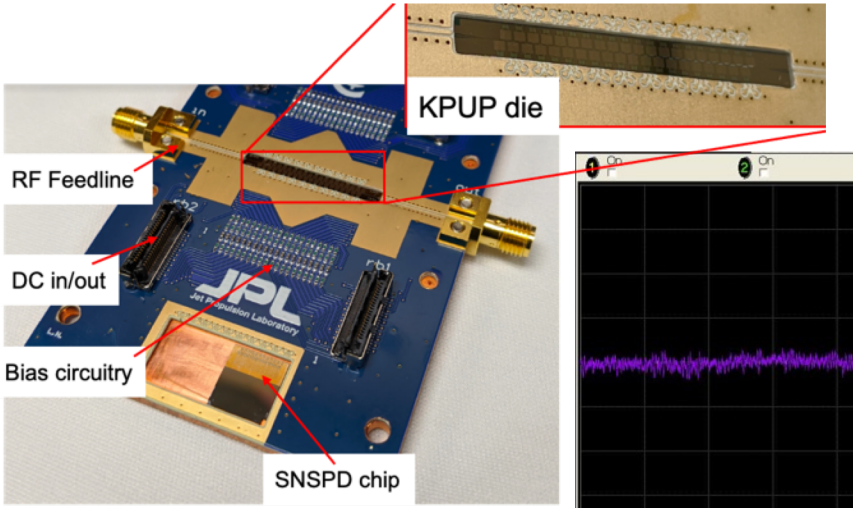
Entangled Photon Pair Source Demonstrator using the Quantum Instrumentation Control Kit System, S. Xie et al, arxiv:2304.01190, submitted to IEEE JQE.



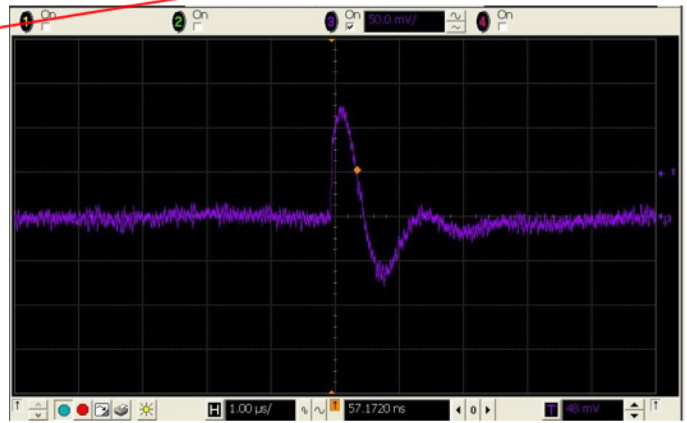


Si Xie FNAL & Caltech

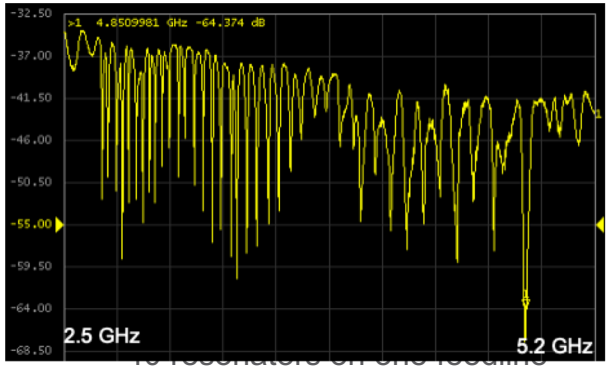
Frequency-Domain SNSPD Readout with QICK

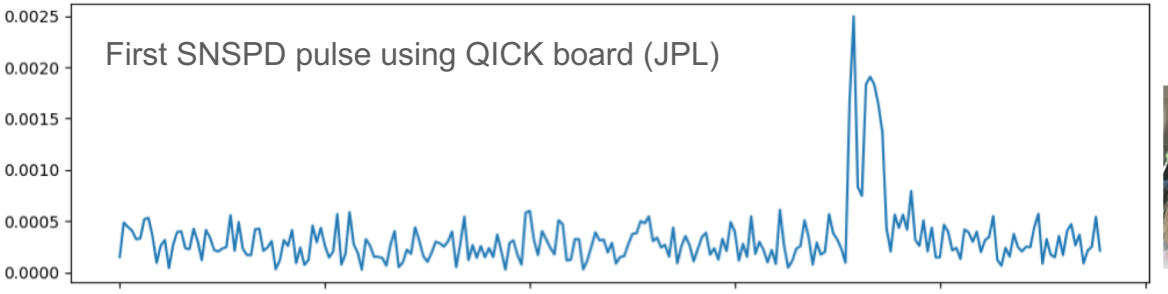


SNSPD array interfaced to resonator chip



Frequency domain SNSPD readout with analog demux





- Frequency-domain multiplexing is the best approach to scale to large arrays of long-wavelength (>10 μm) SNSPDs due to high current sensitivity
- Fermilab / JPL / Caltech / ASU collaboration is has recently measured first SNSPD pulses using QICK hardware and kinetic inductance parametric upconverter (KPUP)

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