

Quantum optics of microwaves with superconducting nanowires 1AGS		Start date:
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<p>Abstract: Superconducting devices are remarkably coherent and scalable, providing an exciting and clear path for quantum technologies. Josephson junctions are at the heart of this technology, as they provide the necessary nonlinearity at the single microwave quanta level with very little dissipation. Design of circuits with junctions made of tunnel barriers, used both in the semi-classical nonlinear sense (for SFQ pulsing) and in the deep quantum regime, is both common and scalable.</p> <p>We propose in this project to use Tungsten Silicide (WSi) as a leading nanowire junction material. WSi is a highly amorphous material, with a very large kinetic inductance nonlinearity. This nonlinearity makes the material highly suitable for quantum optical applications.</p> <p>Milestones:</p> <ul style="list-style-type: none"> • Produce high quality superconducting WSi nanowires devices, integrated with Aluminum and/or Niobium. Measure a reproducible IV response of such junctions. • Develop a broadband microwave amplifier at the single photon level with an extended network of such nanowires and provide the theoretical description • Measure and characterize entangled microwaves emerging from a nanowire network • Understand the creation of on-demand complex output photon states based on time-frequency binning. 		
Recent results:	Publications:	
<ul style="list-style-type: none"> • <i>Proposal for the creation of complex photon states with superconducting tunnel junctions coupled to cavities</i> 	S. Dambach, B. Kubala, J. Ankerhold, <i>Generating Entangled Quantum Microwaves in a Josephson-Photonics Device</i> New J. Phys. 19, 023027 (2017)	
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