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**Strong qubit-photon interactions in a superconducting 1D open space** POL FORN-DIAZ, JEAN-LUC ORGIAZZI, MARTIN OTTO, ALI YURTALAN, Institute for Quantum Computing, University of Waterloo, Waterloo, Canada, BORJA PEROPADRE, Department of Chemistry and Chemical Biology, Harvard University, Cambridge MA, USA, JUAN-JOSE GARCIA-RIPOLL, Instituto de Fisica Fundamental IFF-CSIC, Madrid, Spain, CHRISTOPHER WILSON, ADRIAN LUPASCU, Institute for Quantum Computing, University of Waterloo, Waterloo, Canada — The field of superconducting quantum circuits has seen much progress using many ideas formerly developed for atomic systems, while at the same time exploring new avenues unattainable in other quantum systems. A novel, promising architecture for fundamental studies of quantum electrodynamics in one dimension can be built by coupling a single superconducting qubit to a transmission line [1]. The qubit interacts with the modes of the transmission line, behaving like a single scatterer that can interfere strongly with propagating photons. The interaction between the qubit and the propagating modes of the line can be made ultrastrong, thus enabling a new domain of physics and applications to be investigated. We will present preliminary results on an experiment consisting in a flux qubit-transmission line system at different coupling strengths and its connection to existing models of spin-boson physics [2].

[1] Astafiev et al., Science 327, 840 (2010), Hoi et al., PRL 107, 073601 (2011)
[2] Peropadre et al., PRL 111, 243602 (2013)

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