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Developing magnonic architectures in circuit QED[1] ALEXY KARENOWSKA, ARJAN VAN LOO, University of Oxford, Department of Physics, RICHARD MORRIS, University of Oxford, SANDOKO KOSEN, University of Oxford, Department of Physics — The development of low-temperature experiments aimed at exploring and exploiting magnonic systems at the quantum level is rapidly becoming a highly active and innovative area of microwave magnetics research. Magnons are easily excited over the microwave frequency range typical of established solid-state quantum circuit technology, and couple readily to electromagnetic fields. These facts, in combination with the highly tunable dispersion of the excitations, make them a particularly interesting proposition in the context of quantum device design. In this talk, we survey recent progress made in our group in the area of the hybridization of planar superconducting circuit technology (circuit-QED) with magnon systems. We discuss the technical requirements of successful experiments, including the choice of suitable materials. We go on to describe the results of investigations including the study spin-wave propagation in magnetic waveguides at the single magnon level [1, 2], the investigation of magnon modes in spherical magnetic resonators [3], and the development of systems incorporating Josephson-junction based qubits. [1] A. Karenowska et al., arXiv:1502.06263 (2014). [2] A. van Loo et al., arXiv:1610.08402 (2016). [3] R. Morris et al., arXiv:1610.09963 (2016).

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