EHU Quantum Center

EHU Qc Seminar

Towards on-chip microwave to telecom transduction using erbium doped silicon

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Abstract: The development of a device that converts microwave to optical photons at telecommunication wavelengths would be a key enabler for communication between remote quantum computers and would pave the way for the entanglement of distant superconducting qubits. We investigate ensembles of erbium dopants that exhibit coherent microwave [1] and optical transitions [2]. They can be used as a nonlinear medium mediating an efficient Raman conversion process [3]. High efficiencies require enhancing both the microwave and the telecom transitions with high quality factor resonators. I will present our progress towards low-loss manufacturing and measurements of the spin properties in erbium-doped silicon waveguides, and give an outlook
towards the transduction efficiencies achievable with our approach [4].

[1] A. Gritsch, et al. arXiv:2405.05351 (2024).
[2] A. Gritsch, et al. Phys.Rev.X 12, 041009 (2022).
[3] C. O'Brien, et al. Phys.Rev.Lett. 113, 063603 (2014).
[4] J. Früh, et al. 10.48550/arXiv.2601.13666 (2026).

Theoretical Physics Seminar Room
Wednesday, March 18th , 2026
11:40 am

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