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(I) Realizing a perfect quantum transduction by applying a bad transducer twice

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To utilize the advantages of different quantum platforms, we need an interface (transducer) to transfer quantum information from one to another. Unfortunately, realistic transducers are imperfect due to, e.g. weak interaction strength or unwanted coupling. In this talk, I will present a surprising strategy to remedy the transduction imperfections: by applying a bad transducer twice [1]. I will first introduce a novel characterization of all coherent transducers by their analogous position and momentum noises. I will then show how destructive interference and measurement can be employed to eliminate the unwanted noise. I will also illustrate how the remaining noise can be corrected by using bosonic codes. Our proposal can relax the stringent technological requirement of implementing perfect transducer, and potentially enhance the speed of information transfer.

[1] Hoi-Kwan Lau and Aashish A. Clerk, npj Quantum Information 5, 31 (2019)

Author: Prof. LAU, Hoi-Kwan (Kero) (Simon Fraser University)

Presenter: Prof. LAU, Hoi-Kwan (Kero) (Simon Fraser University)

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