**Quantum resource theory of non-stabilizer states in the one-shot regime**[1] MEHDI AHMADI, HOAN DANG, GILAD GOUR, BARRY SANDERS, Univ of Calgary — Universal quantum computing is known to be impossible using only stabilizer states and stabilizer operations. However, addition of non-stabilizer states (also known as magic states) to quantum circuits enables us to achieve universality. The resource theory of non-stablizer states aims at quantifying the usefulness of non-stabilizer states. Here, we focus on a fundamental question in this resource theory in the so called single-shot regime: Given two resource states, is there a free quantum channel that will (approximately or exactly) convert one to the other?. To provide an answer, we phrase the question as a semidefinite program with constraints on the Choi matrix of the corresponding channel. Then, we use the semidefinite version of the Farkas lemma to derive the necessary and sufficient conditions for the conversion between two arbitrary resource states via a free quantum channel.

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