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Contribution ID: **4223** Type: **Oral Competition (Graduate Student) / Compétition orale (Étudiant(e) du 2e ou 3e cycle)**

(G*) Downloading many-body continuous-variable entanglement to qubits

Tuesday 28 May 2024 15:00 (15 minutes)

Many-body entanglement is essential for most quantum technologies, but generating it on a qubit platform is generally experimentally challenging. On the other hand, continuous-variable (CV) cluster states have recently been realized among over a million bosonic modes. In our work, we present a hybrid CV-qubit approach to generate entanglement between many qubits by downloading it from efficiently generated CV cluster states. Our protocol is based on hybrid CV-qubit quantum teleportation in the displaced Gottesman-Kitaev-Preskill (GKP) basis. We develop an equivalent circuit model to characterize the dominant CV errors: finite squeezing and loss. Our results show that only 6dB squeezing is sufficient for robust qubit memory, and 12dB squeezing is sufficient for fault-tolerant quantum computation. We also show the correspondence between loss and qubit dephasing. Our protocol can be implemented with operations that can be commonly found in many bosonic platforms and does not require strong hybrid coupling.

Keyword-1

continuous variable

Keyword-2

entanglement

Keyword-3

cluster state

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