Canadian Association of Physicists | Association canadienne des physiciens et physiciennes

Contribution ID: **1781** Type: **Poster (Student, In Competition) / Affiche (Étudiant(e), inscrit à la compétition)**

POS-6 - Quantum repeaters with single rare-earth ions in telecommunication wavelengths

Wednesday 31 May 2017 18:12 (2 minutes)

Entanglement distribution over long distances enables us to transfer information securely by means of quantum repeaters across quantum networks. Here we present a scheme for generating heralded entanglement between spatially separated single rare-earth ions doped into crystals. We propose to co-dope each crystal with a single Er ion and several Eu ions. Gate operations between nearby ions can be performed using dipole coupling in order to map the quantum states of rare earth ions onto each other and to establish long-lasting entanglement between distant ions. We also describe preparation strategies that allow us to design quantum repeaters using single rare earth ions.

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Session Classification: DAMOPC Poster Session | Session d'affiches DPAMPC (14)

Track Classification: Division of Atomic, Molecular and Optical Physics, Canada / Division de la physique atomique, moléculaire et photonique, Canada (DAMOPC-DPAMPC)