Entangling two distant oscillator with a quantum reservoir

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The generation of entanglement between two oscillators that interact via a common reservoir is theoretically studied. The reservoir is modeled by a one-dimensional harmonic crystal initially in thermal equilibrium. Starting from a separable state, the oscillators can become entangled after a transient time, that is of the order of the thermalization time scale. This behavior is observed at finite temperature even when the oscillators are at a distance significantly larger than the crystal's interparticle spacing. The underlying physical mechanisms can be explained by the dynamical properties of the collective variables of the two oscillators which may decouple from or be squeezed by the reservoir. Our predictions can be tested with an ion chain in a linear Paul trap.

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