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【461】Stationary optomechanical entanglement between a mechanical oscillator and its measurement apparatus

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We provide an argument to infer stationary entanglement
between light and mechanical oscillator based on measurement of light only. We propose an experimentally realizable scheme involving an
optomechanical cavity driven by a resonant, continuous-wave field operating in the non-sideband-resolved regime. This corresponds to the conventional configuration of an optomechanical position- or force-sensor. We show
analytically that entanglement between mechanics and
output-field of the cavity can be inferred from the measurement of squeezing in Einstein-Podolski-Rosen quadratures of suitable temporal modes of the stationary light-field.
Squeezing can reach levels of up to 50% of noise reduction below shot-noise in the limit of large cooperativity. Entanglement persists even in the limit of small cooperativity.

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