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Coupled ion - nanomechanical systems[1] LIN TIAN[2], PETER ZOLLER, Institute for Theoretical Physics, University of Innsbruck, 6020 Innsbruck, Austria — The nanomechanical modes can be manipulated and probed via their coupling with effective quantum two level systems. Here we study a coupled ion - nanomechanical system where the ion is in a nanotrap with the electrodes being nanomechanical resonators. The motion of the ion and that of the nanomechanical modes can be described as coupled harmonical oscillators. The ions play the role of a quantum optical system that acts as a probe and control, and allows entanglement with or between nanomechanical resonators. We show as examples the laser cooling and the entanglement generation between the resonators [1] L. Tian and P. Zoller, quant-ph/0407020

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[2]Current address: National Institute of Standards and Technology, 100 Bureau Drive, Stop 8423, Gaithersburg, MD 20899-8423

Lin Tian
Institute for Theoretical Physics, University of Innsbruck
6020 Innsbruck, Austria

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