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Temperature driven structural phase transition for trapped ions ZHE-XUAN GONG, GUIN-DAR LIN, LU-MING DUAN — A Wigner crystal formed with trapped ion can undergo structural phase transition, which is determined only by the mechanical conditions on a classical level. Instead of this classical result, we show that through consideration of quantum and thermal fluctuation, a structural phase transition can be solely driven by change of the system's temperature. We determine a finite-temperature phase diagram for trapped ions using the renormalization group method and the path integral formalism, and propose an experimental scheme to observe the predicted temperature-driven structural phase transition, which is well within the reach of the current ion trap technology.

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