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Making Dipolar Chain Liquid and Crystal[1] DAW-WEI WANG, JHIH-SHIH YOU, Department of Physics, National Tsing-Hua University, Hsinchu, Taiwan 300 — Recent experimental progress on ultra-cold polar molecules opens new realms to explore intriguing quantum phase with dipolar interaction. One of possible phenomena is self assembled chain liquid in a stack of strongly confined pancake traps. It is, however, not easy for polar molecules to form a spontaneous chain liquid due to lack of binding mechanism. Here, we propose an adiabatic process and calculate the entropy and resulting temperature for the formation of dipolar chain liquis after adiabatically switching on the electric field and then followed by reducing the optical lattice field. We further investigate the elementary excitations of the dipolar chain crystal and derived the finite temperature KTNHY transition as well as compressibility of such many-body system. We also discuss how such interesting large-composite object can be experimentally measured even above the quantum degenerate temperature.

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