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Quantum fluids of self-assembled chains of polar molecules¹ DAW-WEI WANG, National Tsing-Hua University, Hsinchu, Taiwan, MIKHAIL D. LUKIN, EUGENE DEMLER, Harvard University — We study polar molecules in a stack of strongly confined pancake traps. When dipolar moments point perpendicular to the planes of the traps and are sufficiently strong, the system is stable against collapse but attractive interaction between molecules in different layers leads to the formation of extended chains of molecules, analogously to the chaining phenomenon in classical rheological electro- and magnetofluids. We analyze properties of the resulting quantum liquid of dipolar chains and show that only the longest chains undergo Bose-Einstein condensation with a strongly reduced condensation temperature. We discuss several experimental methods for studying chains of dipolar molecules.

¹D.-W. Wang, M.D. Lukin, and E. Demler, 97, 180413 (2006)

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