

The Phase Coherence of Molecular Bose condensates

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In the last two years, exciting progresses on Bose-Einstein condensations (BEC) of molecules with bosonic atoms have been made. The Chicago group led by Chin has reported the achievement of the BEC of the G-wave Feshbach Cs molecules [1], and its “super-chemistry” [2]. The Columbia group led by Will has created an ultra-cold gas of Na-Cs ground state molecules closed to BEC [3]. In this talk, I shall discuss the phase coherences of different classes of molecular condensates (Ref[1]-[3]) and their experimental consequences – connection to super-chemistry [2], the longtime issues of half-vortices, and the intrinsic angular momentum in condensed matters, Ref [4].

References:

- [1] Zhang, Z, Chen L., Yao, K,-X. & Chin, C. Transition from an atomic to a molecular Bose-Einstein condensate. *Nature* 708-711 (2021)
- [2] Zhengdong Zhang, Shu Nagata, Kaixuan Yao, Cheng Chin, Many-body Chemical Reaction in a Quantum Degenerate Gas, arXiv:2207.08295v2
- [3] Ian Stevenson, Aden Z. Lam, Niccolò Bigagli, Claire Warner, Weijun Yuan, Siwei Zhang, and Sebastian Will, Ultracold Gas of Dipolar NaCs Ground State Molecules, arXiv: 2206.00652v1
- [4] Tin-Lun Ho, The Bose-Einstein Condensate of G-wave Molecules and Its Intrinsic Angular Momentum, arXiv:2101.054321v1.

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