Abstract Submitted for the DAMOP09 Meeting of The American Physical Society

Interference of Two Molecular Bose-Einstein Condensates CHRISTOPH KOHSTALL, STEFAN RIEDL, EDMUNDO R. SANCHEZ GUA-JARDO, Inst. for Quantum Optics and Quantum Information, Acad. of Science, 6020 Innsbruck, Austria, LEONID A. SIDORENKOV, JOHANNES HECKER DENSCHLAG, Inst. of Experimental Physics and Center for Quantum Physics, Univ. Innsbruck, 6020 Innsbruck, Austria, RUDOLF GRIMM, Inst. for Quantum Optics and Quantum Information, Acad. of Science, 6020 Innsbruck, Austria Interference of Bose-Einstein condensates (BECs) strikingly demonstrates the wave nature of matter. In this talk, we present the observation of interference of BECs made of molecules. The molecules are weakly bound dimers consisting of fermonic lithium atoms close to the 834-G Feshbach resonance. We condense these molecules in a double well potential. After release, the clouds overlap and we record interference fringes by absorption imaging. We explore different scenarios that affect the contrast of the interference fringes. (1) As expected, the fringes vanish above the critical temperature for BEC. (2) Contrast is also reduced with further increasing the interaction strength between the molecules. (3) The contrast changes periodically in time when we excite collective modes along the direction of imaging.

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Date submitted: 26 Jan 2009

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