How does entanglement evolve in quantum gases! UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386 Nhat is entanglement? Why study entanglement? •**┤╡┤** Two entangled particles - even XQX if separaled by the entire universe — can "communicate" Quantum Quantum Quartum Quantum without time delay Teleportation Encryption Computing Metrology Our Kesearch with Ultracold Quantum Clases How to measure Ultracold quantum gases are ideal Illtracold" here means 0.00000001K (~-273.15°C)! Systems to study <u>complex</u> quantum phenomena entargliment Entenglement separate gas has with no Propogate system and ask Does entanglement continually grow? generation entongkoment "Particle" 1 "Particle" 2 HOW DOES ENTANGLEMENT EVOLVE ? L'A Here, we measure the 0 6 \odot (\) Does entanglement disappear? "communication", i.e., the entanglement porticle collisions This collision process create entonglement (+1) can happen in both The measurement itself is incredibly hard! directions OR something else? The central goal of this project is to improve upon current techniques. Many particle collisions Our atoms have three different "modes" (%): (+1) () (-1) Fime

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