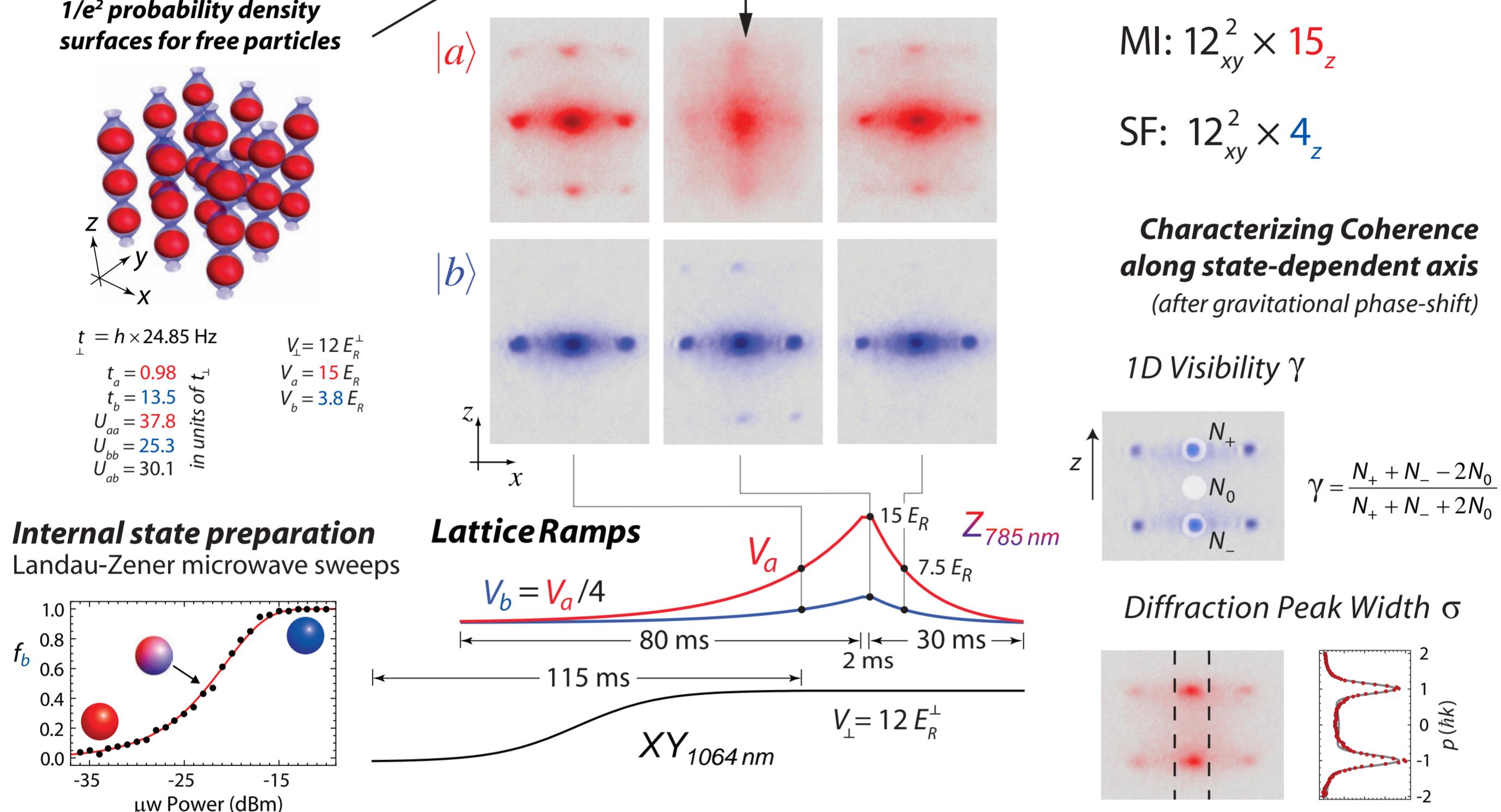


Superfluidity of Interacting Bosonic Mixtures in Optical Lattices

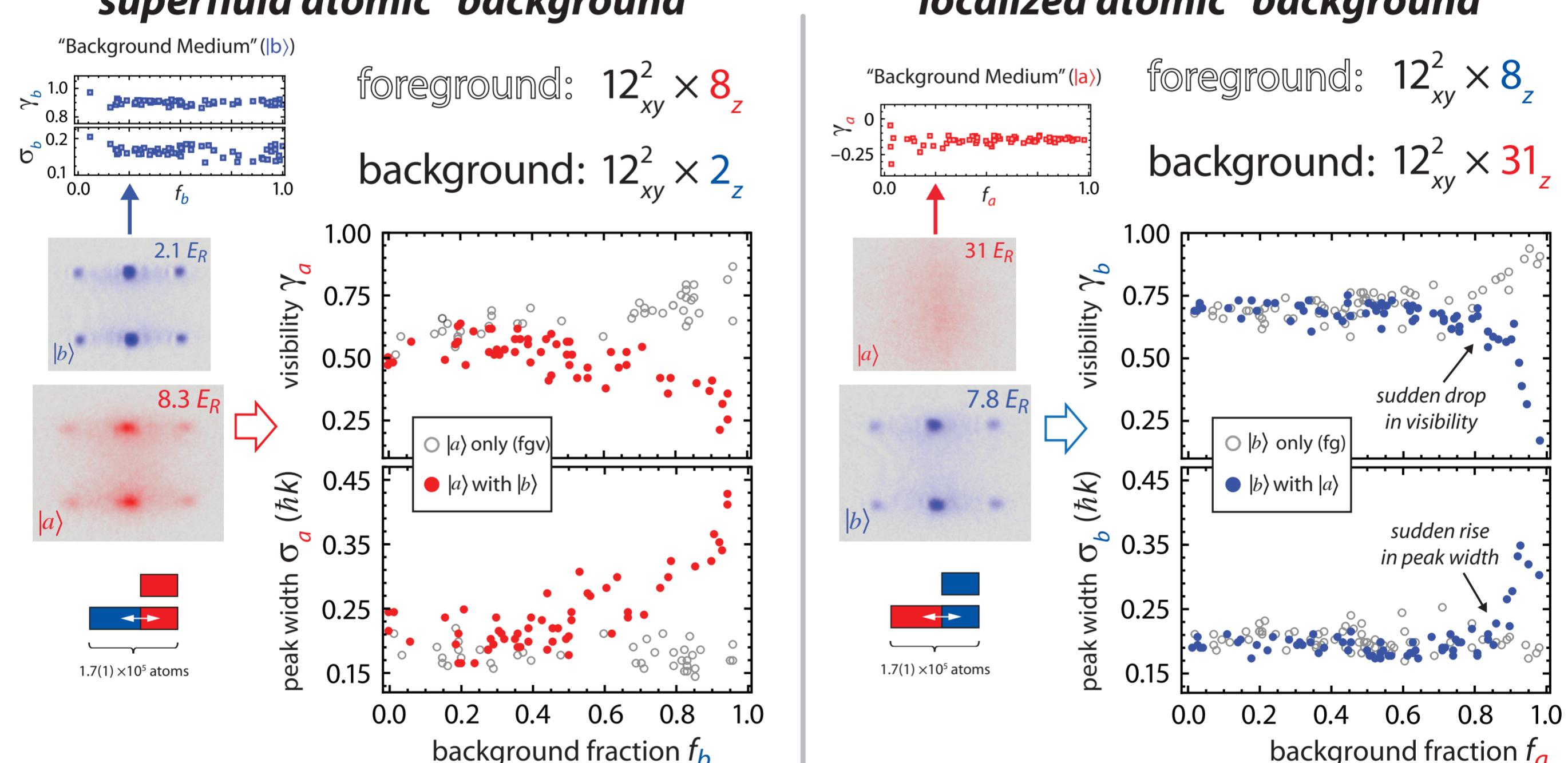
Bryce Gadway, Daniel Pertot, René Reimann, and Dominik Schneble

Department of Physics and Astronomy, Stony Brook University, Stony Brook, New York 11794-3800, USA

State-selective SF-MI transition

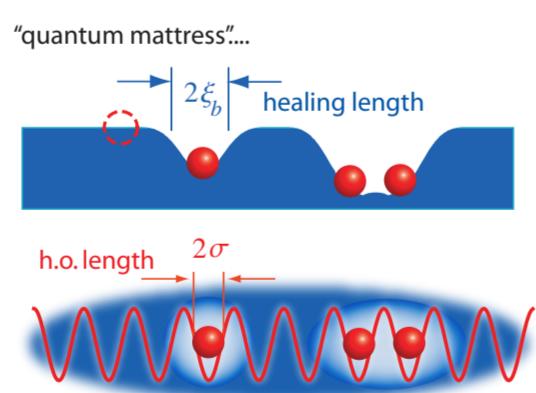
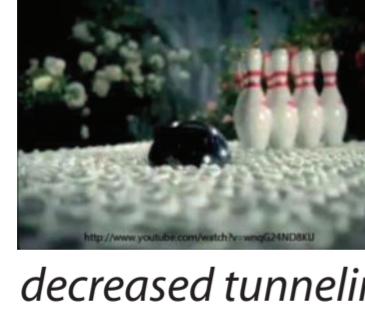


Effects of Interspecies Interactions



Polaron-like effects?

(good) classical mattress....

decreased tunneling,
clustering of "impurities"Bruderer et al., PRA **76**, 011605(R) (2007)

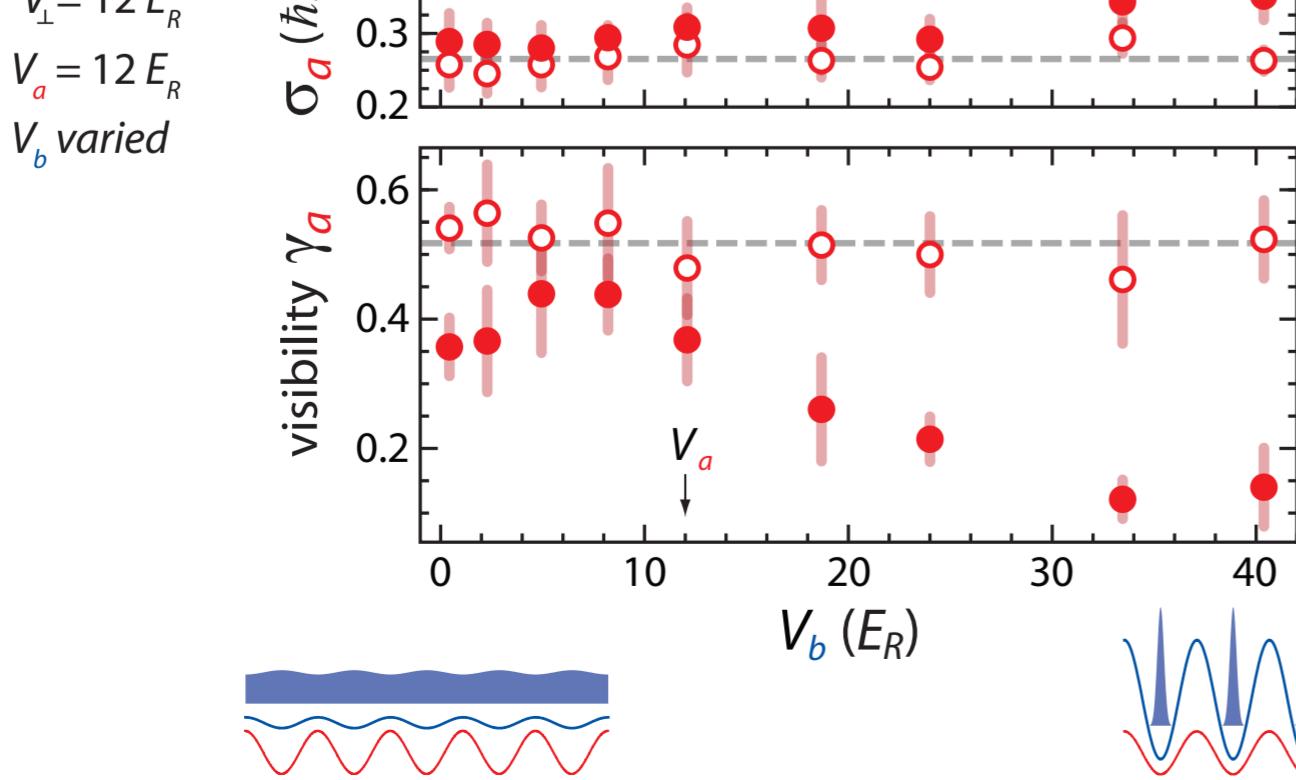
"quantum emulsion"?

Roscilde & Cirac, PRL **98**, 190402 (2007)

percolation threshold?



variable atomic "background medium"

 $12_{xy}^2 \times 12_z$ $12_{xy}^2 \times 0 - 40_z$

○ ■

3.7(2) × 10⁵ atomsEffect on $|a\rangle$ as z-lattice for $|b\rangle$ component is varied

Second species generally leads to decreased coherence of the primary species.

Strongest effects for second species in large majority, and with large difference in lattice depths.