

Cold atom theory: activities in Warsaw

$$i\hbar\partial_t\Psi = \left(-\frac{\hbar^2}{2m}\nabla^2 + V\right)\Psi$$



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Outline:

- Piotr Deuar:

Simulations of incoherent atom dynamics in supersonic BEC collisions.

- Pawel Zin:

Huge quantum fluctuations in a two-component Bose gas in a double well.

- Zbigniew Idziaszek:

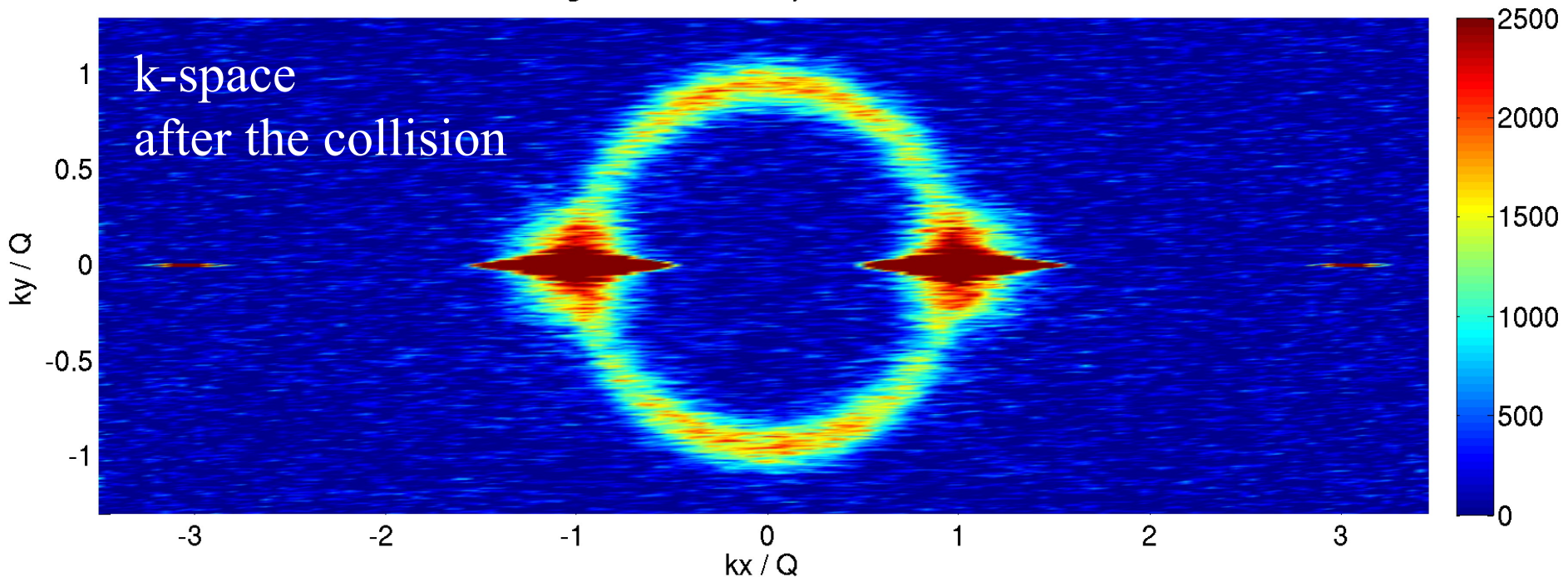
Ultracold atom-ion collisions

Supersonic BEC collision

WITH: Chris Westbrook, Jean-Christophe Jaskula, Valentina Krachmalnicoff, Marie Bonneau, Guthrie Partridge, Vanessa Leung, Karen Kheruntsyan (UQ)

STAB method - Stochastic time-adaptive Bogoliubov

deg90n1e5 nskxky t Q = 1.8634

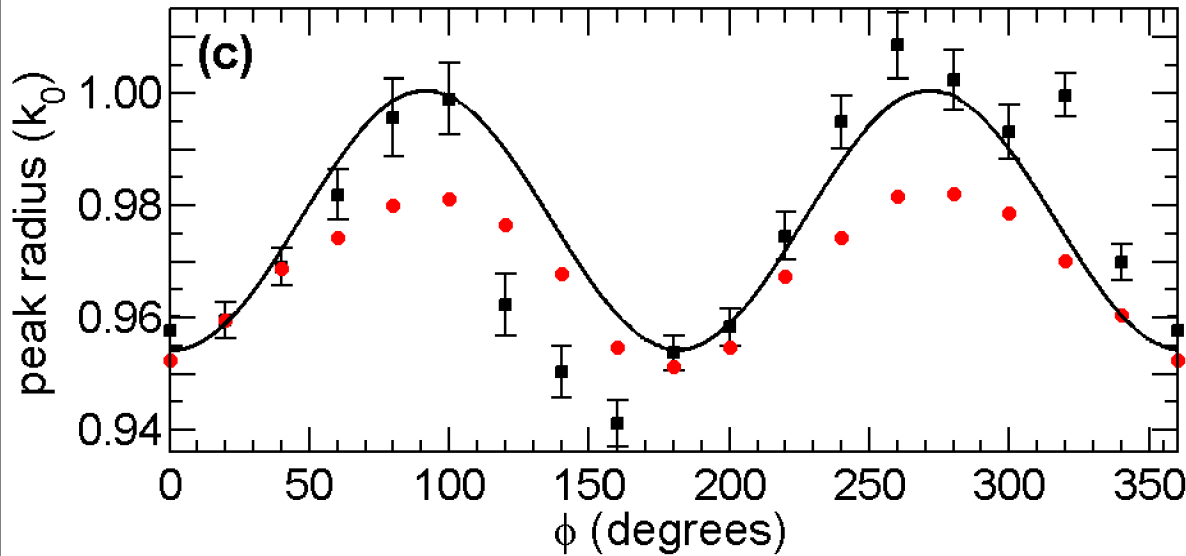


What is still missing:

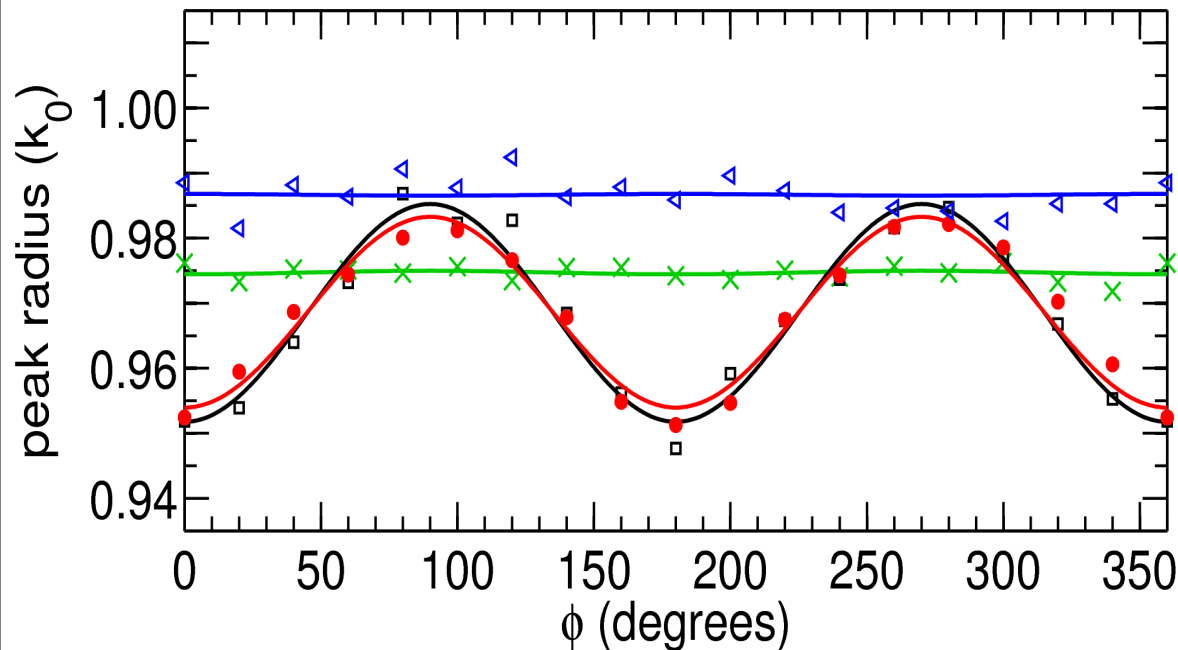
- fluctuations of total number N (“trivial” but tedious to add)
- spin mixture (“probably” simple to add)
- $T > 0$ (nontrivial, but we're working on it)

Time evolution

Dissection of Bogoliubov



Black: experiment
Red: simulation



Green: spherical BECs
Blue: no expulsion cost
Black: Full Bogoliubov
Red: Full Quantum M.

Correlations ($k, -k$)

