pseudo-gap?
Rudi Grimm

http://alpenverein-frankfurtmain.de/gruppen/Bergsteigergruppe/images/berichte/4-Gletscherspalte.JPG
scissors mode: hydrodynamic behavior

Wright et al., PRL 99, 150403 (2007)
scissors mode: hydrodynamic behavior

Riedl et al., PRA 78, 053609 (2008)

theory part by Georg Bruun and Hendrik Smith (Trento, Copenhagen)

calculation of effective collision rate (trap averaged)

→ frequencies and damping rates of various collective modes
scissors mode: hydrodynamic behavior

Riedl et al., PRA 78, 053609 (2008)

experimental part by Innsbruck group

measurement of T-dependent frequencies and damping rates
scissors mode: hydrodynamic behavior

Riedl et al., PRA 78, 053609 (2008)

experimental part by Innsbruck group

measurement of T-dependent frequencies and damping rates

no evidence for pseudo-gap pairing
early theory (Törmä, Levin): qualitative confirmations,
...but problem of strong finite state interactions
hydrodynamic data vs. rf spectra

Paired vs unpaired atoms

![Diagram showing hydrodynamic data vs. rf spectra]
state-of-the-art interpretation

theory by Pieri, Perali, and Strinati including finite-state interactions and trap effects

joint paper with Innsbruck
arXiv:1102.2735

Figure 1: Experimental rf spectra of a trapped $^6$Li gas near $T_c$ (circles) are compared with theoretical calculations (DOS+AL) or (DOS) which include or neglect final-state effects. (a) Data near unitarity (822G) reproduced from Ref.[3]; (b) New data at unitarity (834G).
state-of-the art interpretation

double-hump structure from pseudo-gap and superfluid pairing

Figure 3: Experimental rf spectra of a trapped $^6$Li gas below $T_c$ (circles) are compared with theoretical calculations with (BCS-RPA, AL) or without (DOS) final-state effects.
state-of-the-art interpretation

- **T near $T_c$**
- **T well below $T_c$**
- **high $T$**

- free atoms
- pseudo-gap
- superfluid
up to discussion!