ultracold.atoms

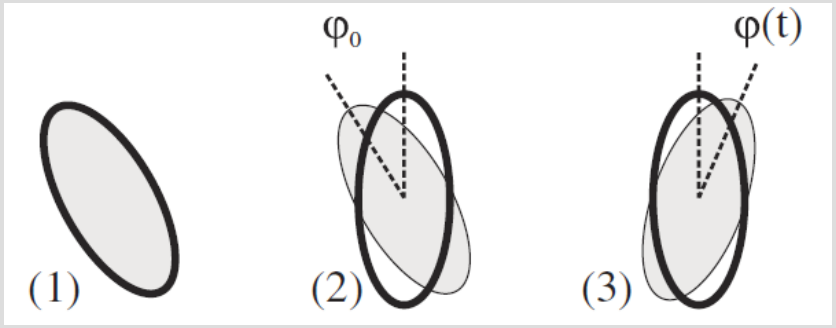
pseudo-gap?

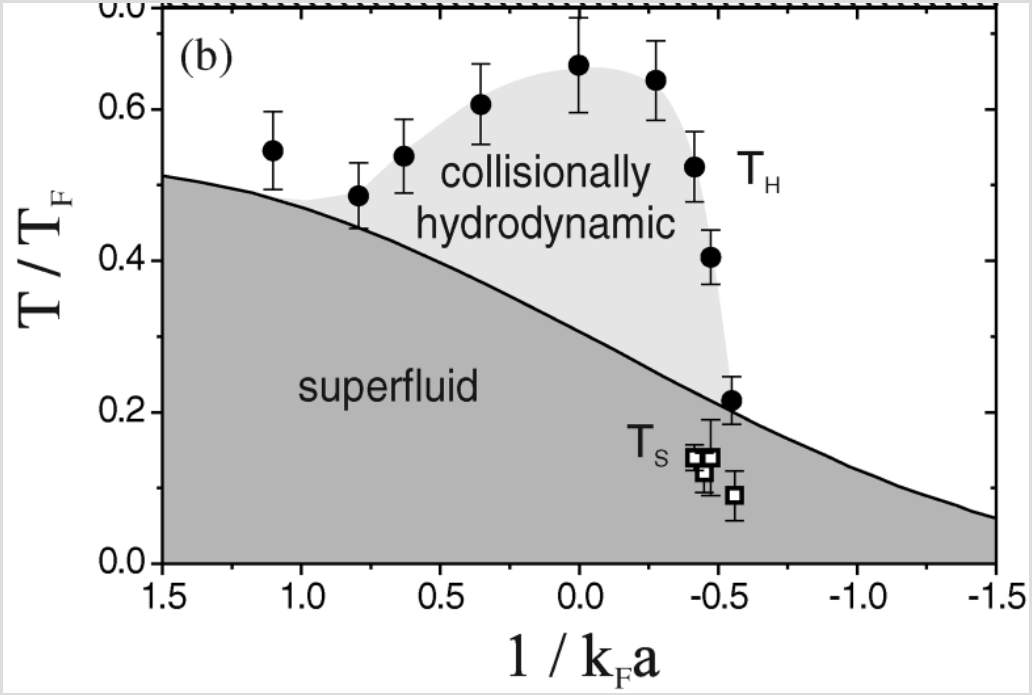
Rudi Grimm

http://alpenverein-frankfurtmain.de/gruppen/Bergsteigergruppe/images/berichte/4-Gletscherspalte.JPG

scissors mode: hydrodynamic behavior

Wright et al., PRL 99, 150403 (2007)



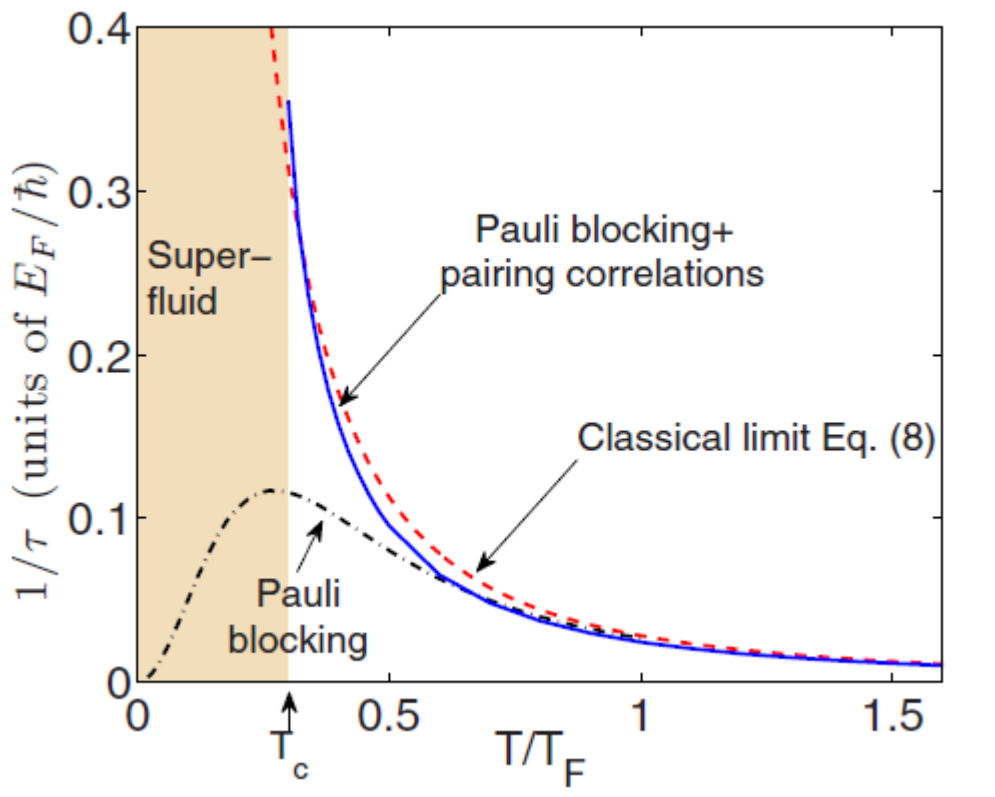


scissors mode: hydrodynamic behavior

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

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

calculation of effective collision rate (trap averaged)



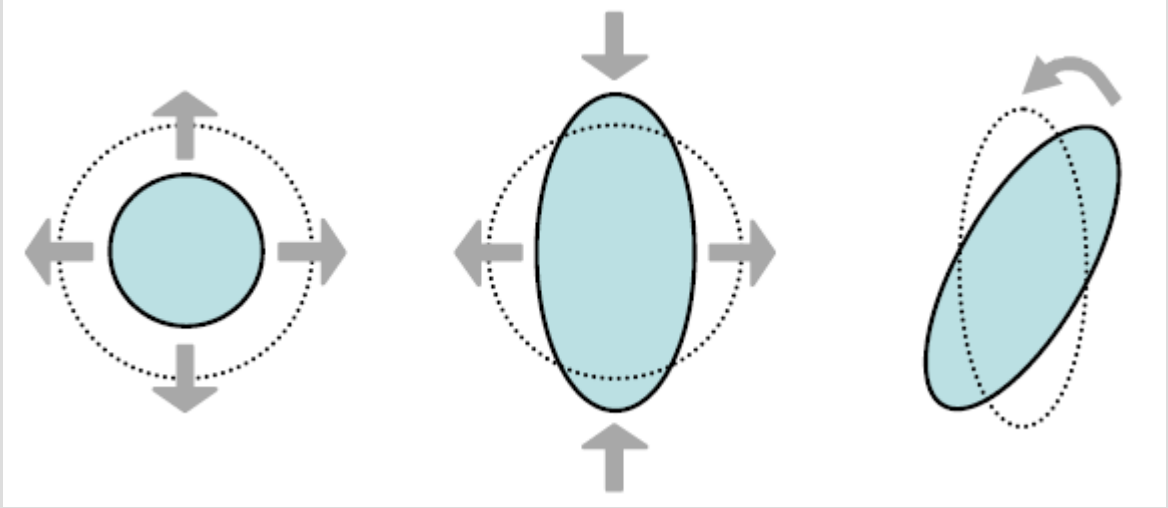
⇨ frequencies and damping rates of various collective modes

scissors mode: hydrodynamic behavior

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

experimental part by Innsbruck group

measurement of T-dependent frequencies and damping rates

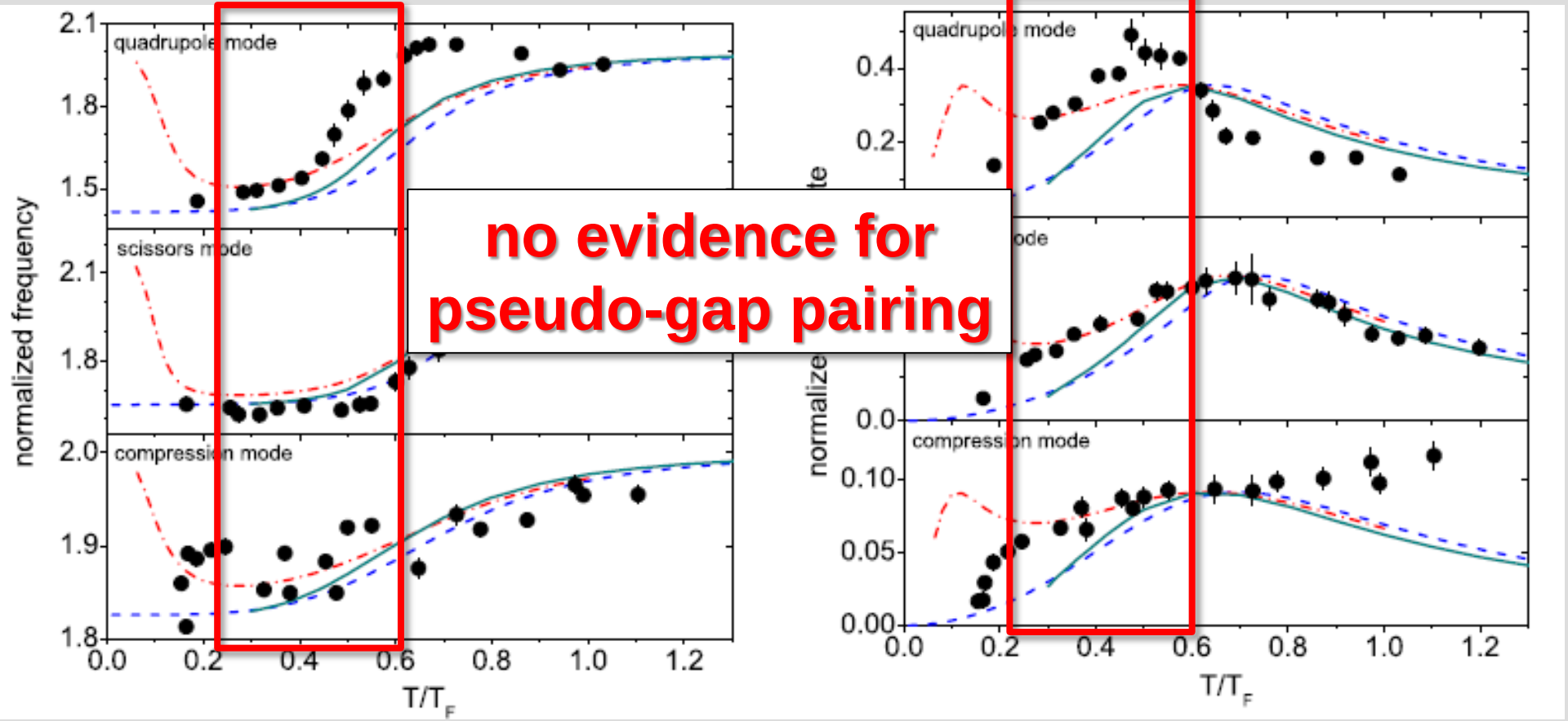


scissors mode: hydrodynamic behavior

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

experimental part by Innsbruck group

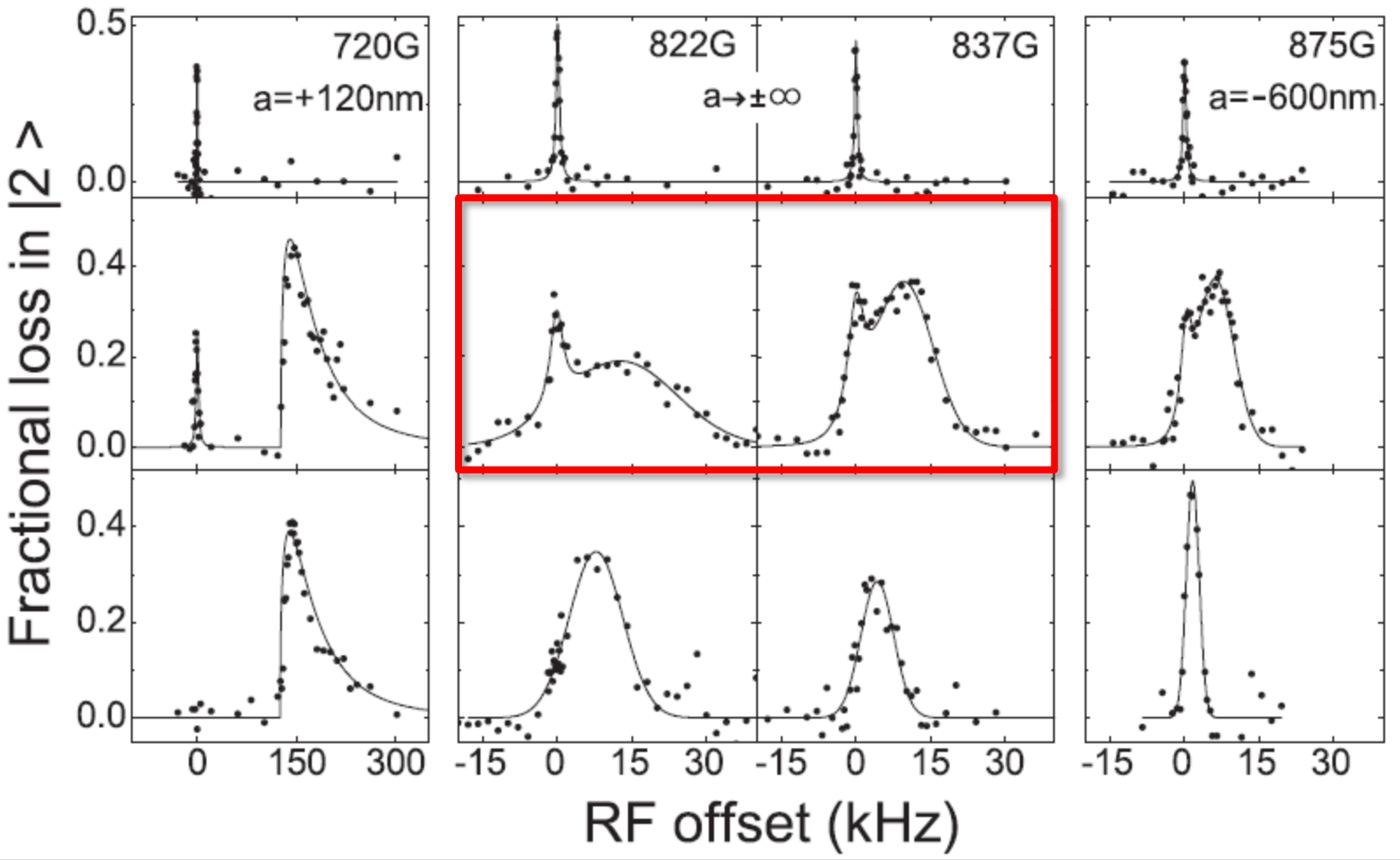
measurement of T-dependent frequencies and damping rates



no evidence for pseudo-gap pairing

rf spectroscopy (2004 Innsbruck data)

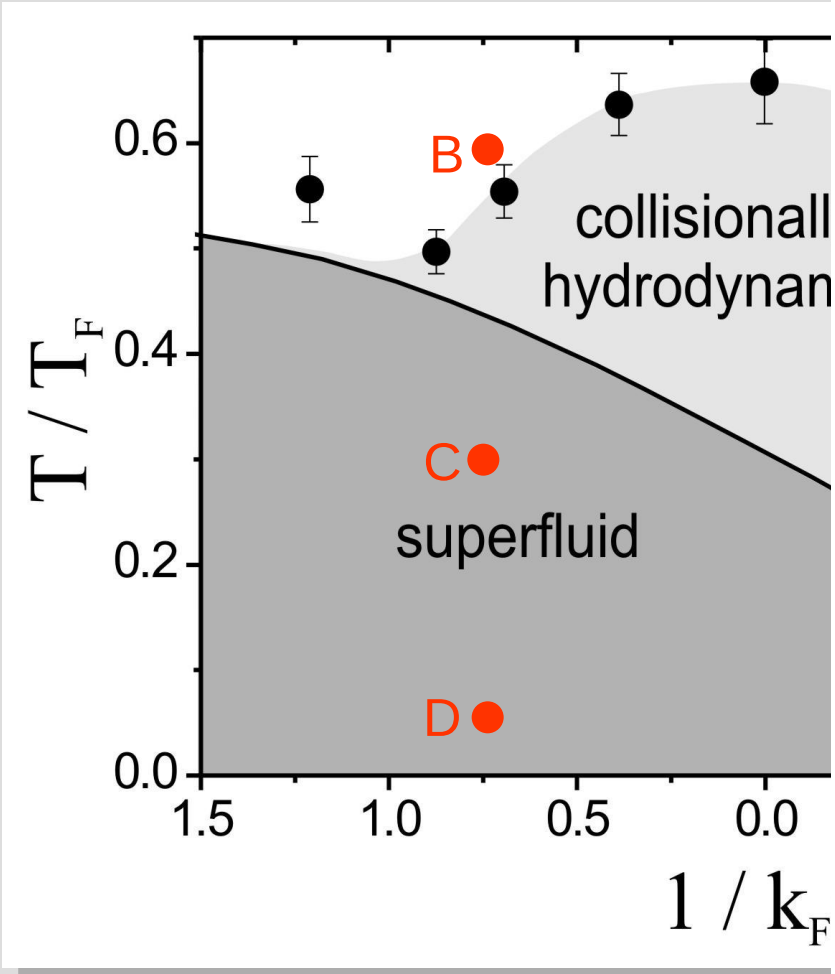
Chin et al., Science 305, 1128 (2004)

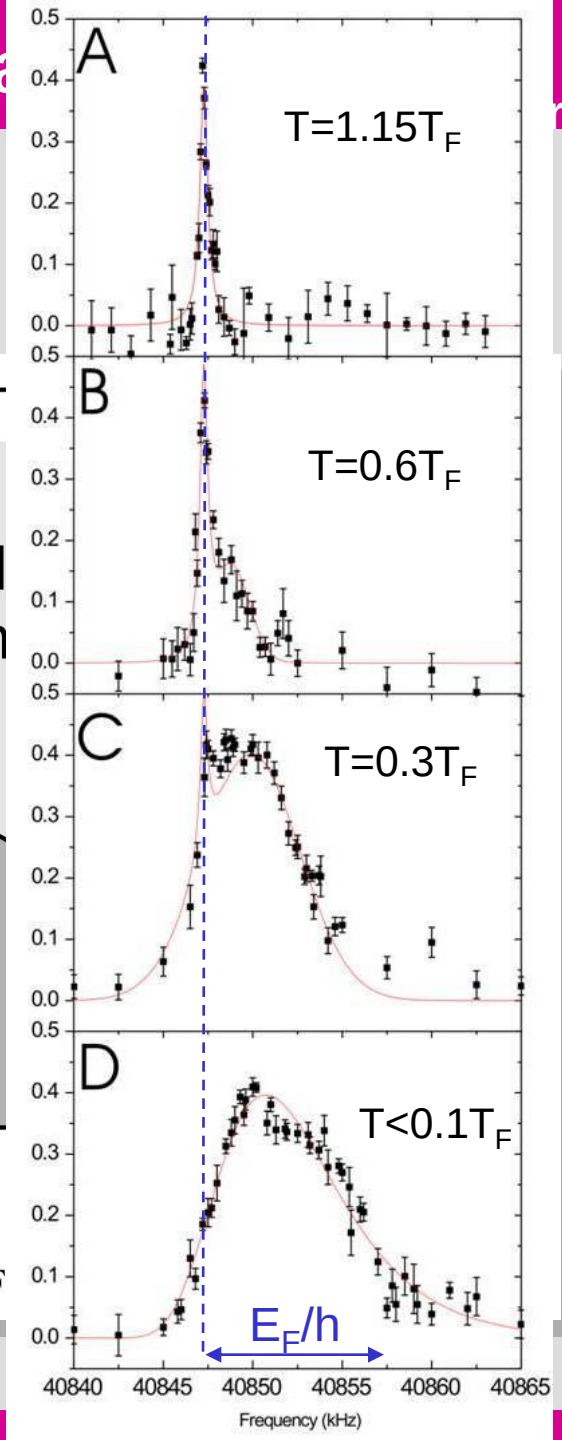


early theory (Törmä, Levin): qualitative confirmations,
...but problem of strong finite state interactions

hydrodynamic data vs. rf spectra

paired vs unpaired atoms





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

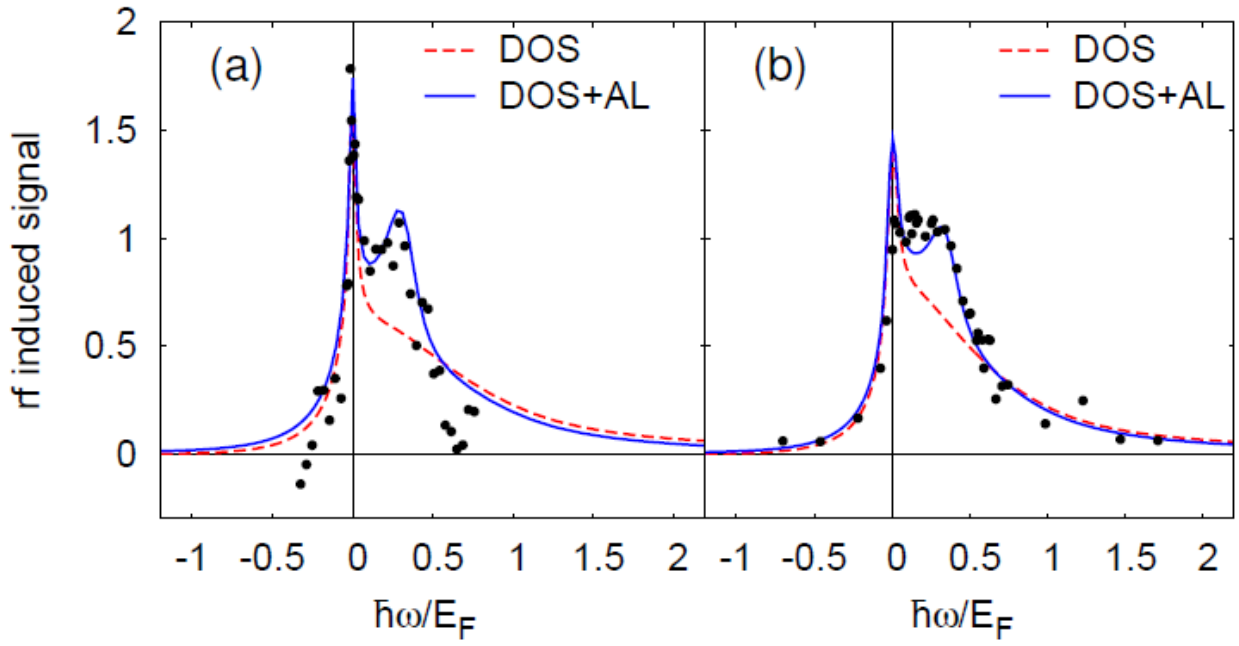


Figure 1: Experimental rf spectra of a trapped ^{6}Li gas near T_c (circles) are compared with theoretical calculations (DOS+AL) or (DOS) which include or neglect final-state effects. (a) Data near unitarity (822G) reproduced from Ref.[3]; (b) New data at unitarity (834G).

state-of-the art interpretation

double-hump structure from **pseudo-gap** and **superfluid pairing**

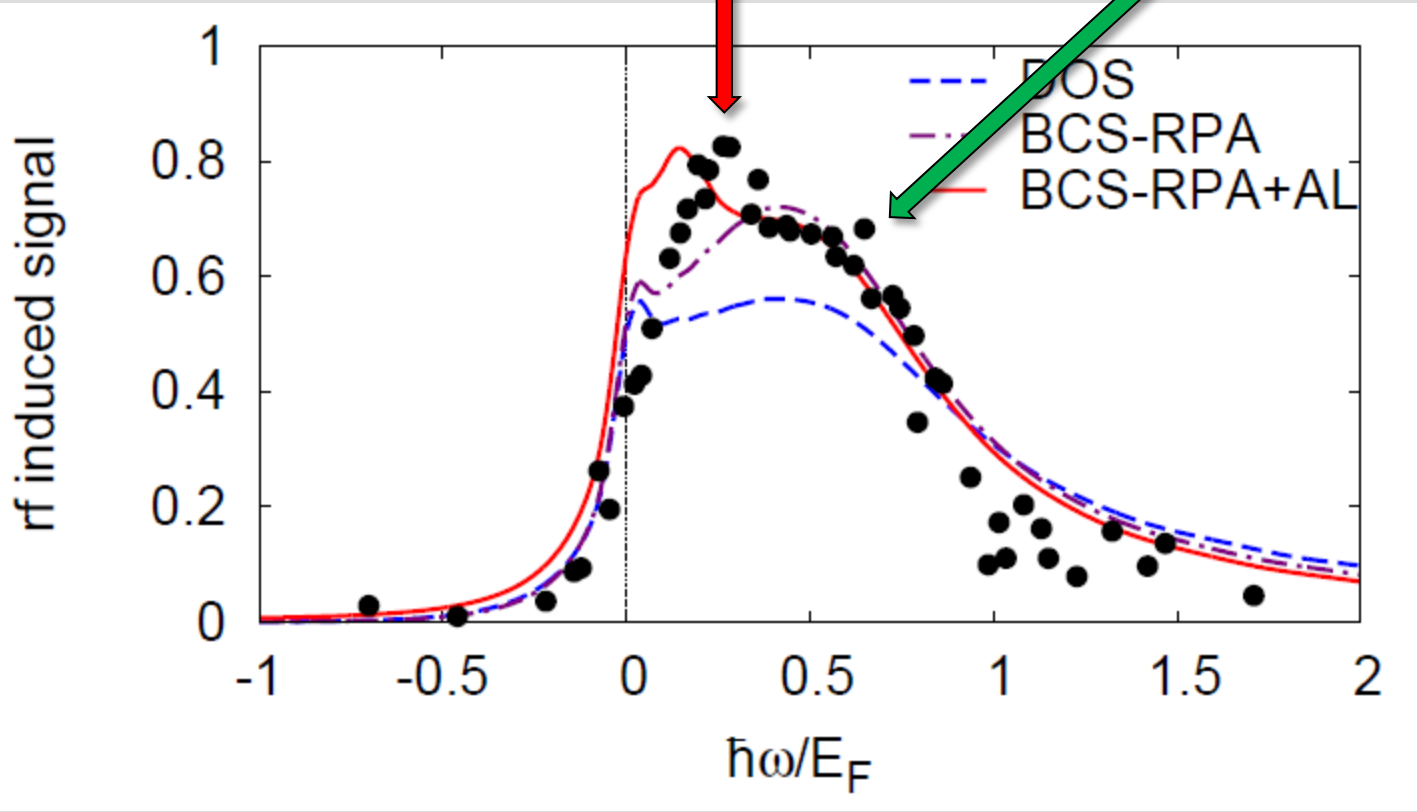
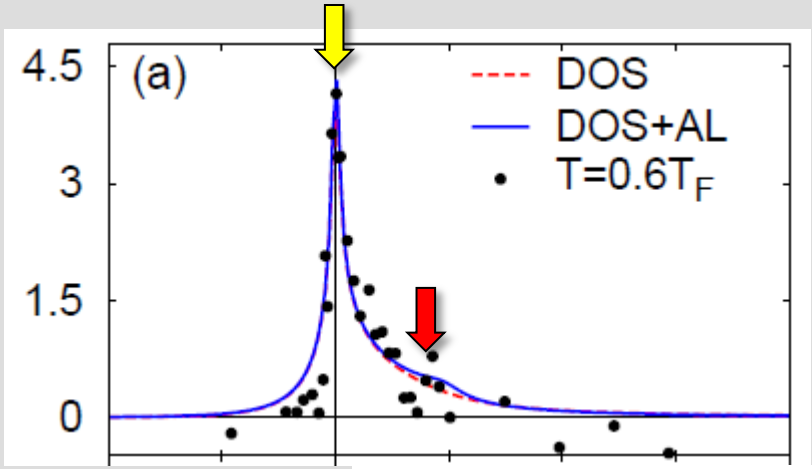


Figure 3: Experimental rf spectra of a trapped ^{6}Li gas below T_c (circles) are compared with theoretical calculations with (BCS-RPA, AL) or without (DOS) final-state effects.

state-of-the-art interpretation



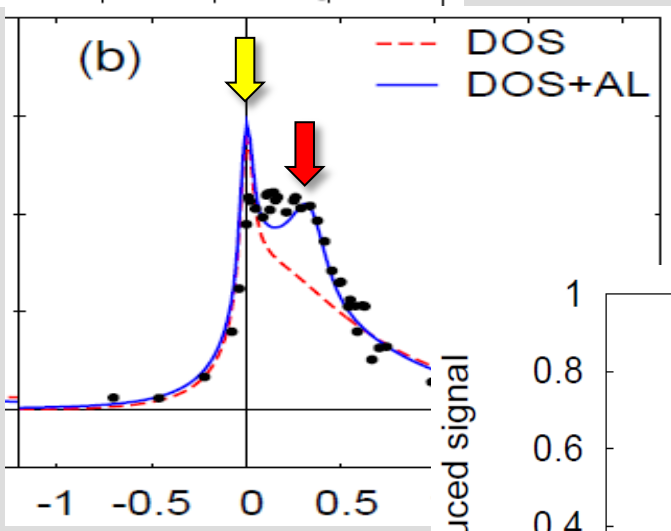
high T

free atoms

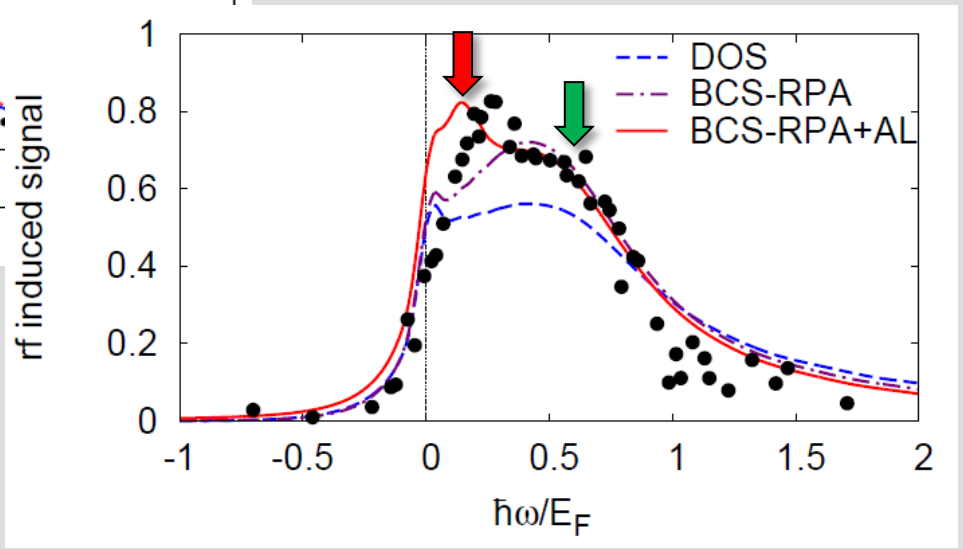
pseudo-gap

superfluid

T near Tc



T well below Tc



up to discussion!