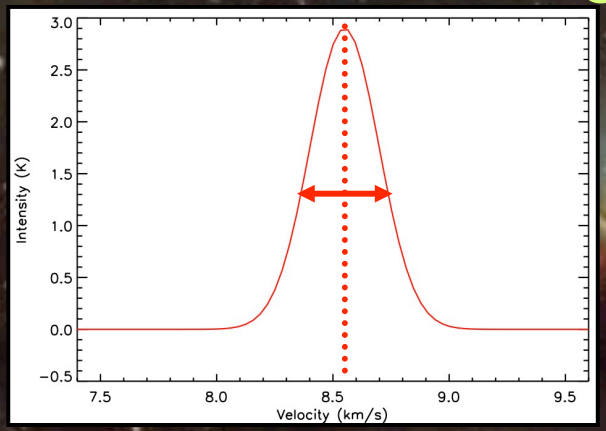
Dense Cores and Their Environs

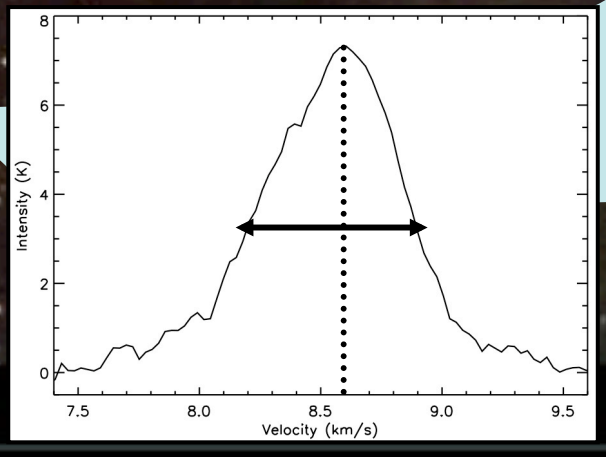
Helen Kirk
NSERC PDF

with Doug Johnstone (HIA / UVic)
Shantanu Basu (UWO)
& Mario Tafalla (OAN, Spain)

Dynamics of Dense Cores in Perseus

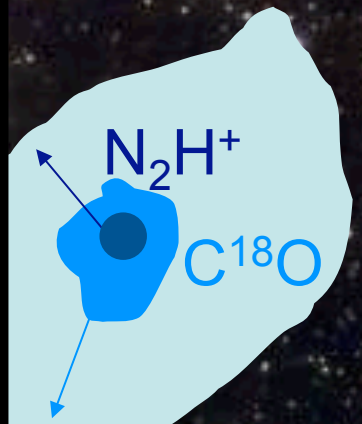
- IRAM 30m survey of ~100 dense cores in N_2H^+ (1-0) and $C^{18}O$(2-1), plus whole cloud coverage in ^{13}CO(1-0) (COMPLETE)





Difference in V_C is small - usually less than the sound speed

(see also Walsh & Myers 2004, 2007)

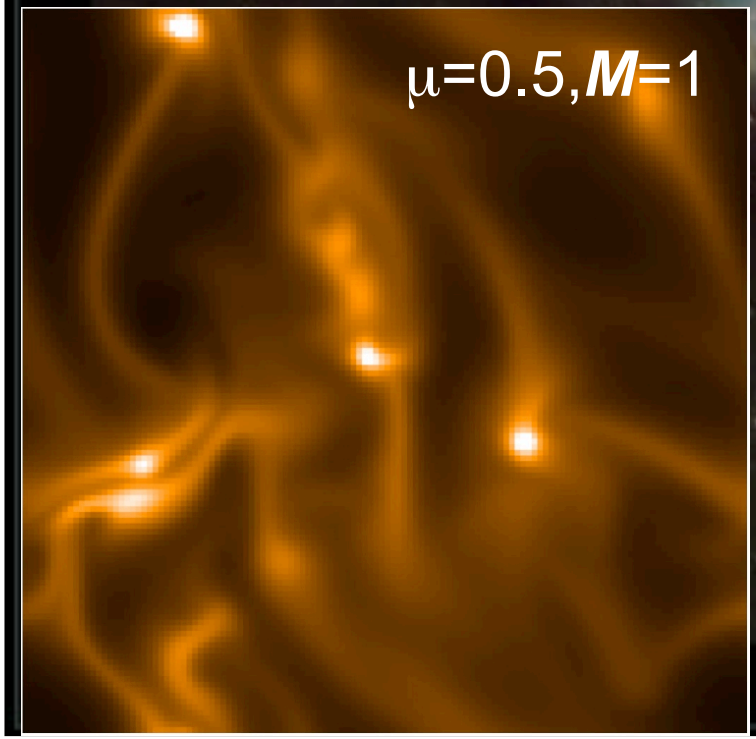


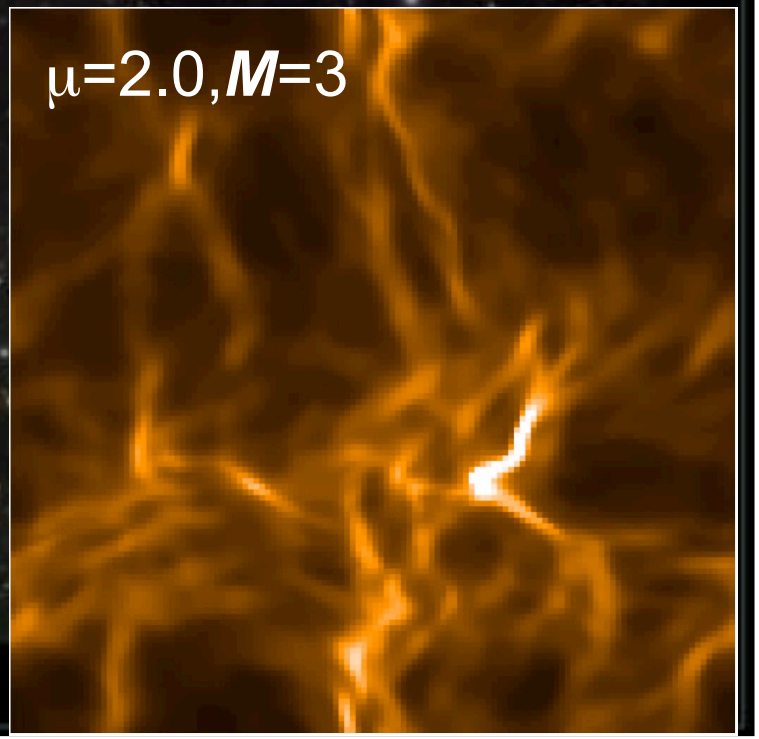
Kirk, Johnstone, & Tafalla 2007

Comparison to Simulations

(Ciolek & Basu 2006; Basu, Ciolek & Wurster 2009)

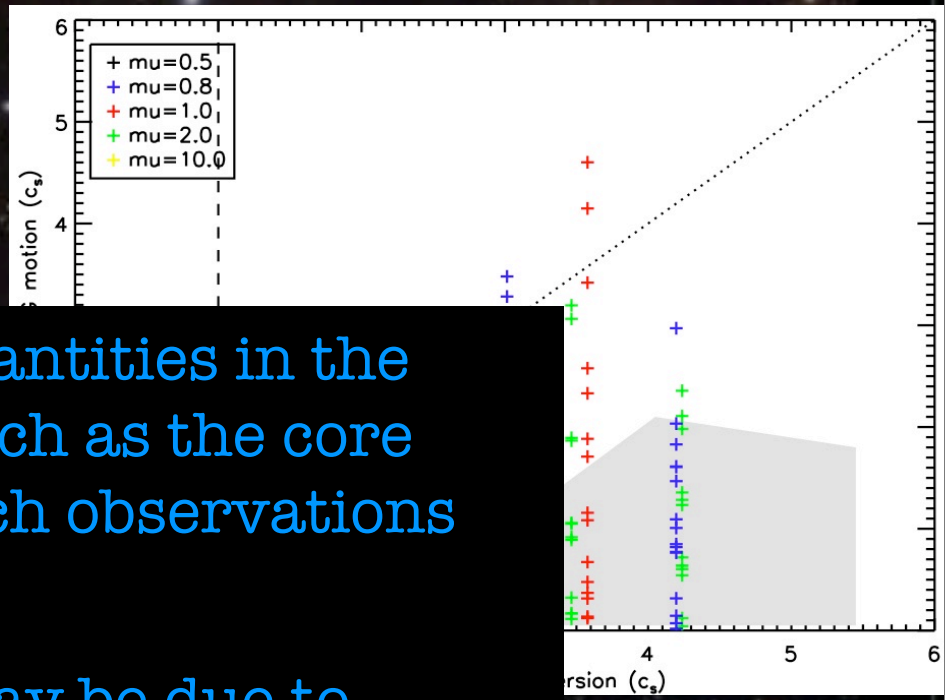
- Examined 20 thin sheet MHD simulations spanning μ= 0.5 to 2 and M = 0 to 4
- 'observed' to mimic Perseus observations





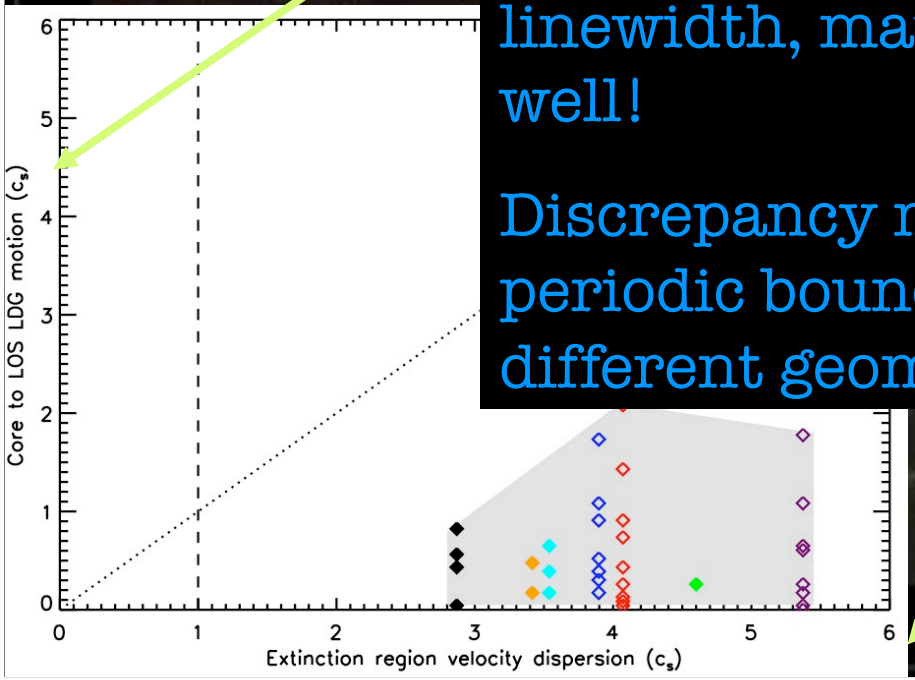
Core Motion

difference in centroid velocities



Note: Other quantities in the simulations, such as the core linewidth, match observations well!

Discrepancy may be due to periodic boundary conditions, different geometry, etc



ersion of lower density environment (from ^{13}CO)

Kirk, Johnstone, & Basu 2009

Future Directions :
Gould Belt Legacy Surveys

The dynamical relationship between dense cores and their environment can constrain models of star formation

Gould Belt Surveys (JCMT, Spitzer, Herschel) will soon be providing a wealth of data to base further dynamical surveys →effect of environment on core formation can be investigated!