

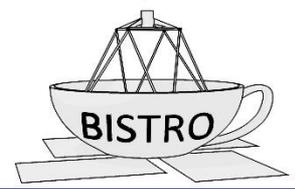
Herschel & SCUBA-2 Synergy

A 10-year Perspective



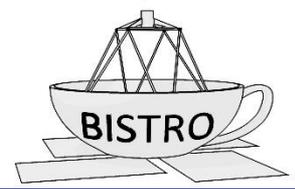
Pattle et al., 2015,
MNRAS, 450, 1094

Derek Ward-Thompson
Jeremiah Horrocks Institute, University of Central Lancashire
'Herschel 10 years after'
ESAC, 14th May 2019

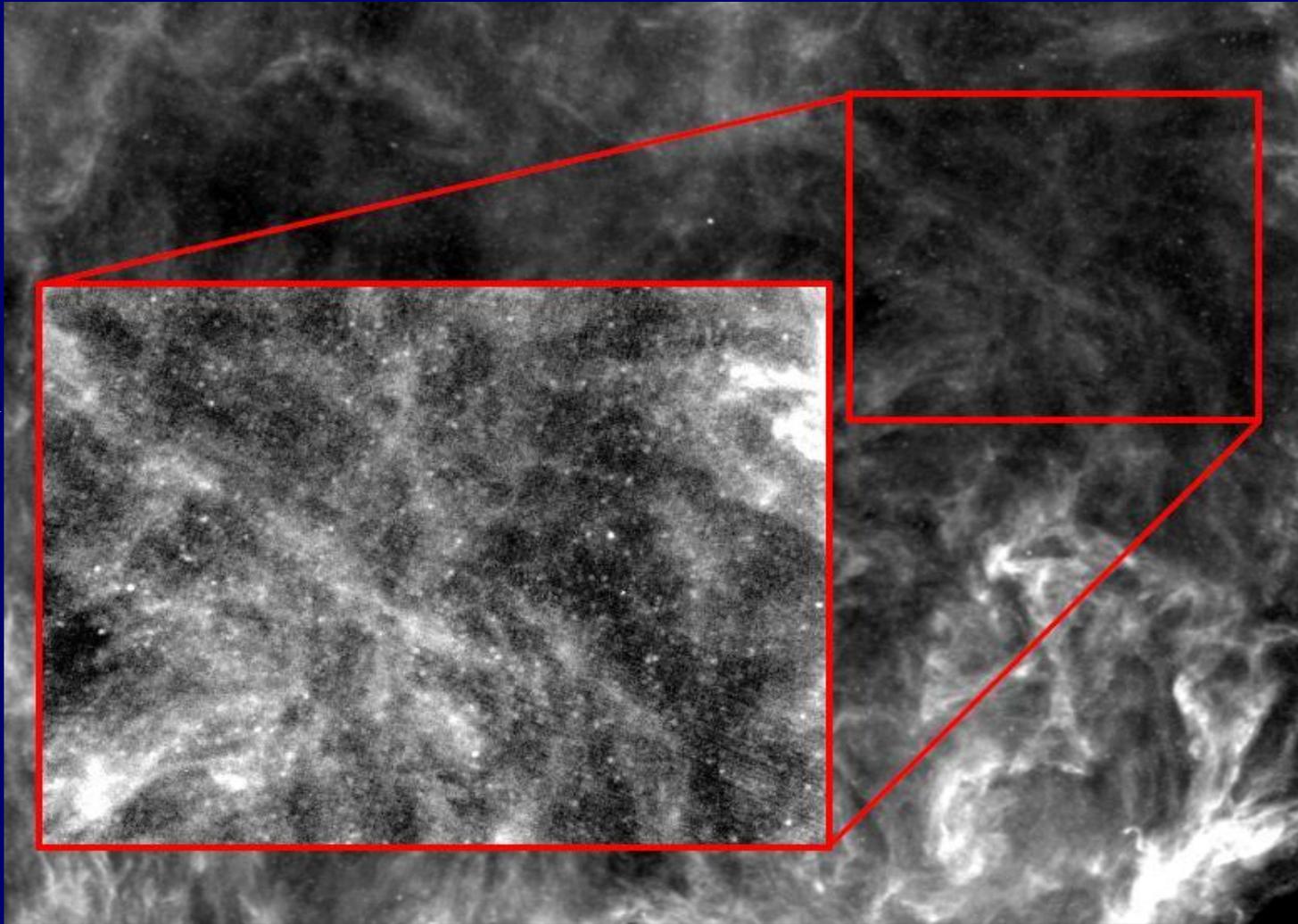


Herschel: launched 14th May 2009

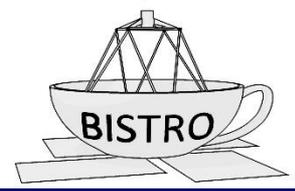




Polaris



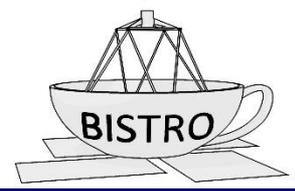
Ward-Thompson
et al., 2010,
A&A, 514, L92



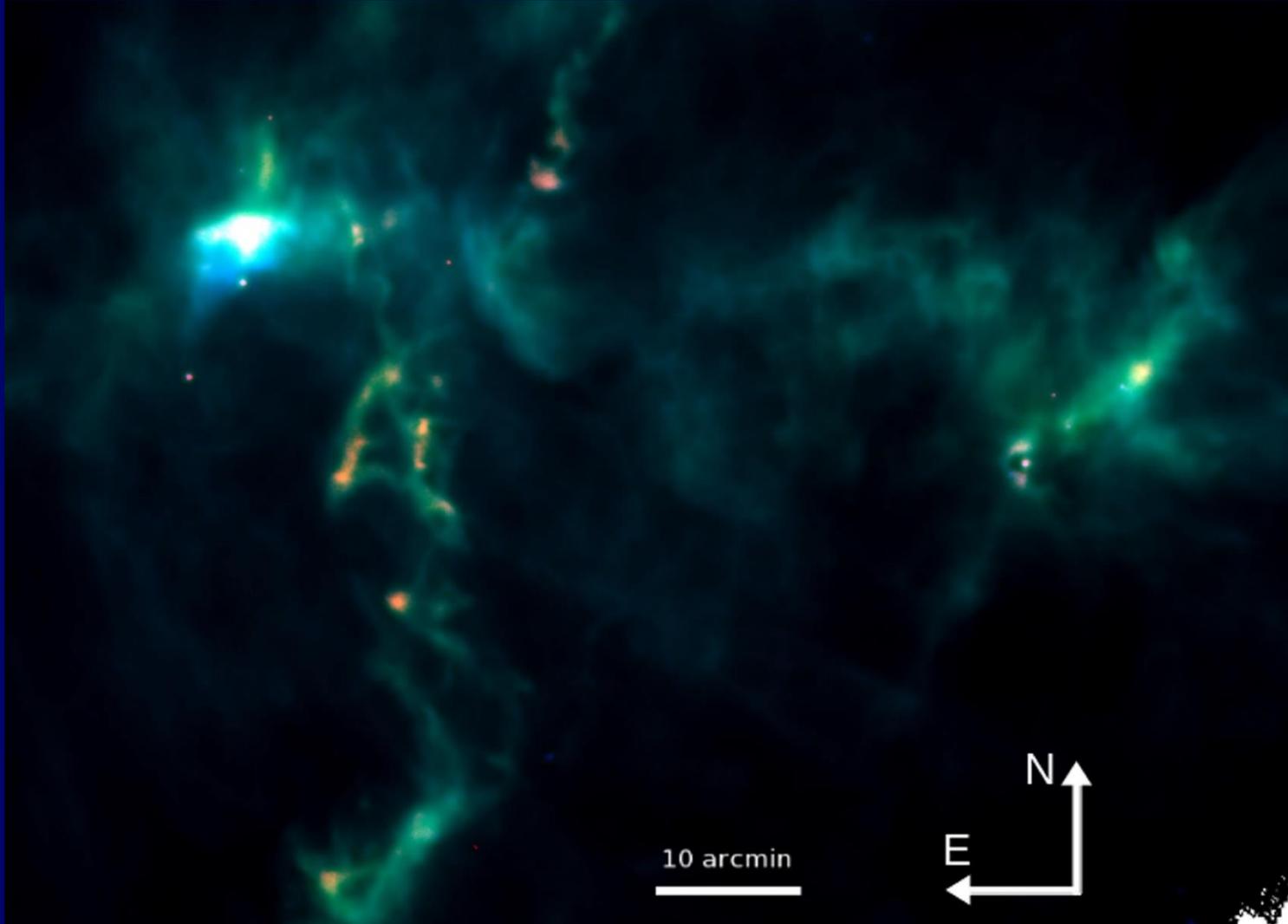
Herschel SPIRE Consortium

RAS Group Gold Award Winners 2014

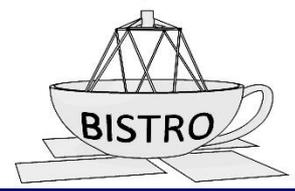




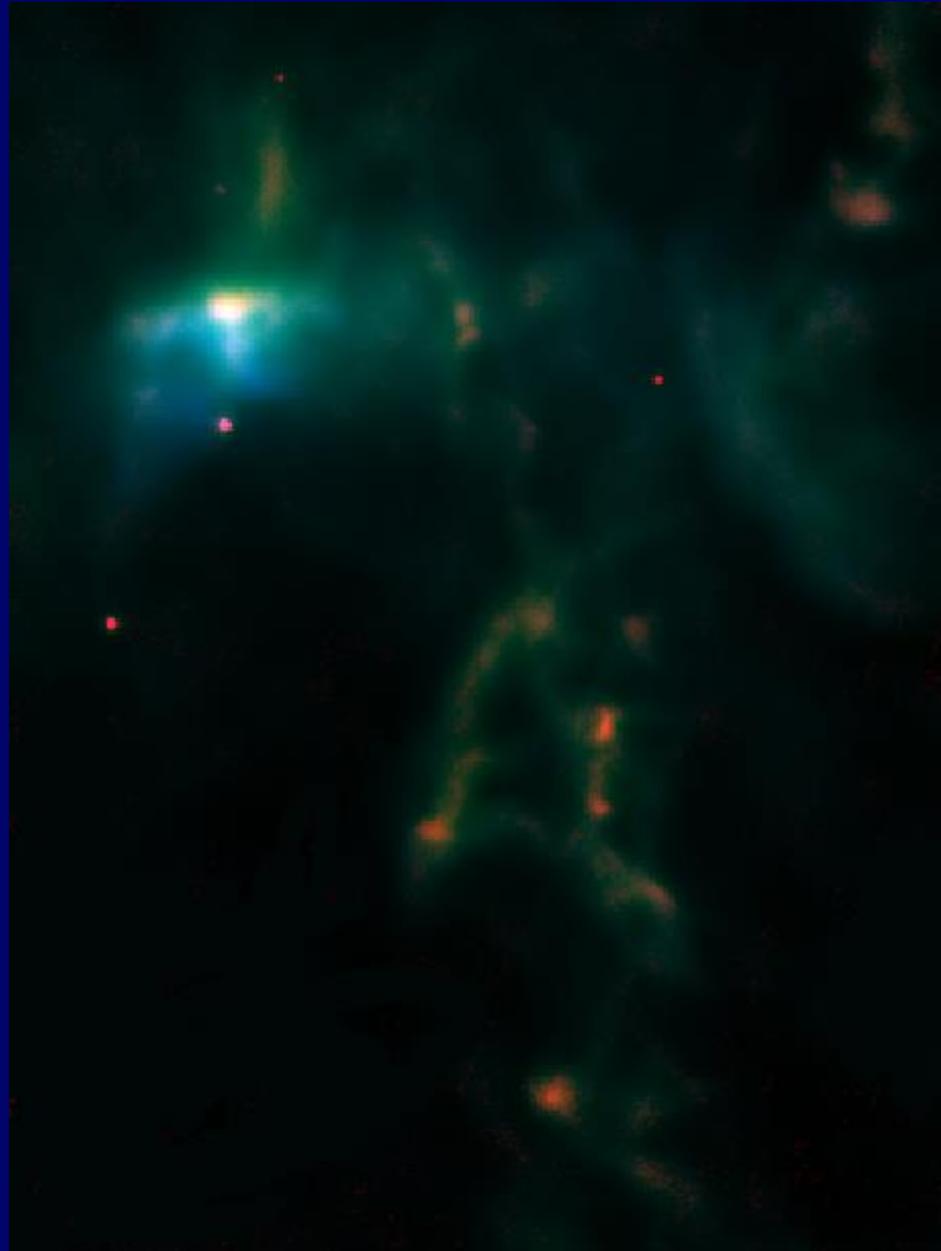
Herschel sees everything



W-T et al.,
2016,
MNRAS,
463, 1008



SCUBA2 sees cores



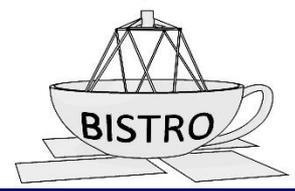
Red – 850um

Green – 500um

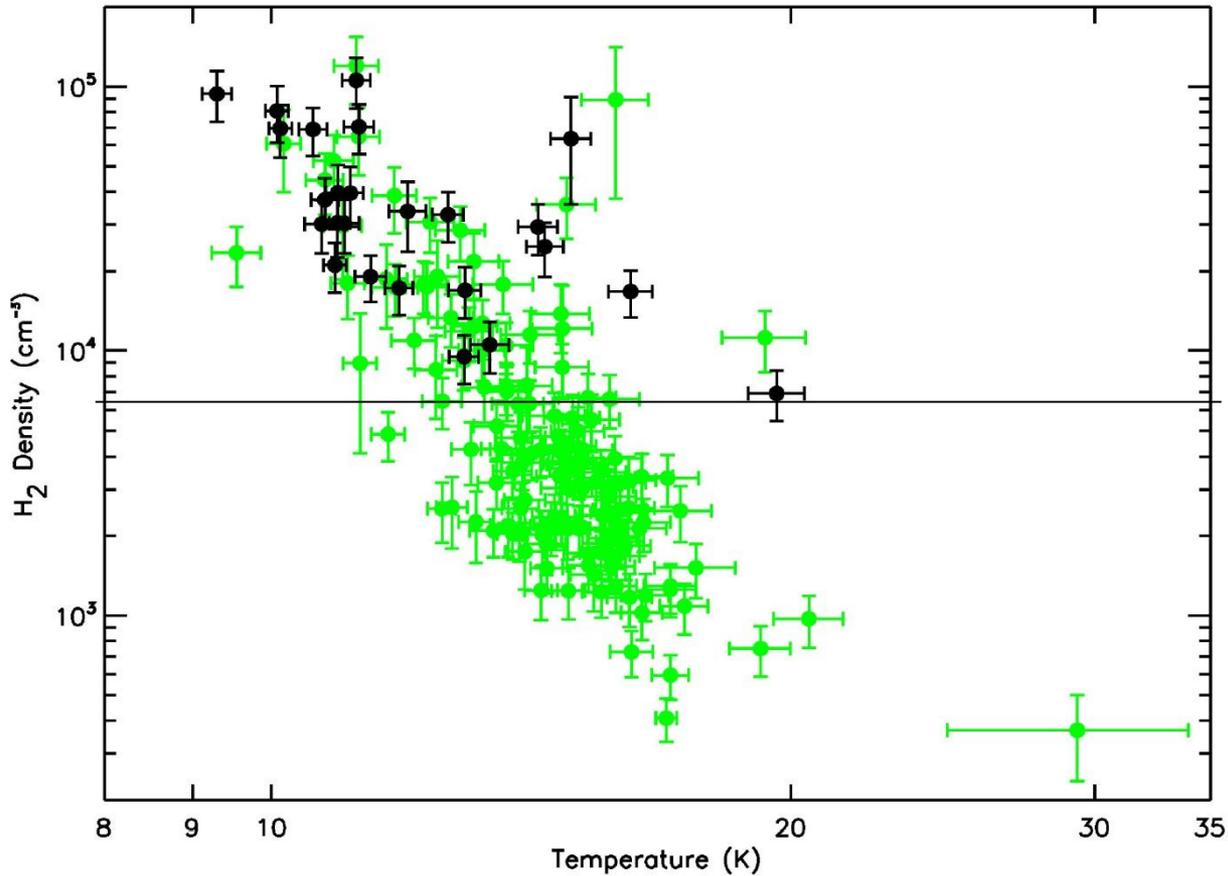
Blue – 250um

W-T et al.,
2016,
MNRAS,
463, 1008

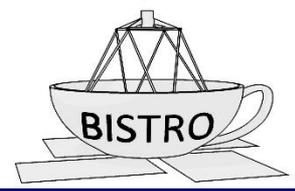
Note the red cores



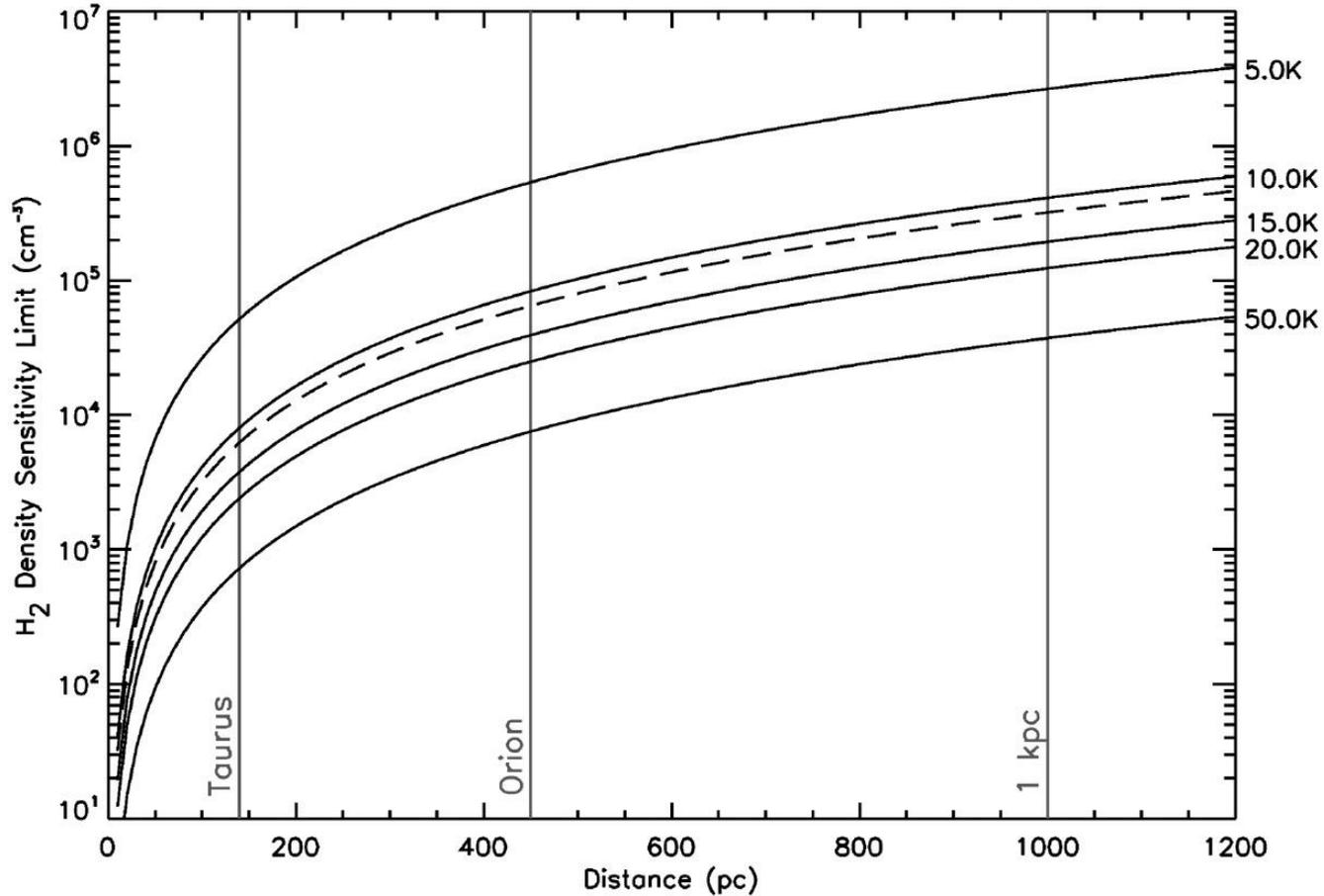
Density sensitivity



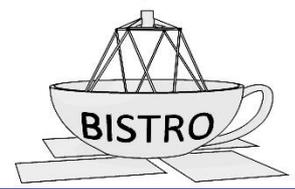
W-T et al.,
2016,
MNRAS,
463, 1008



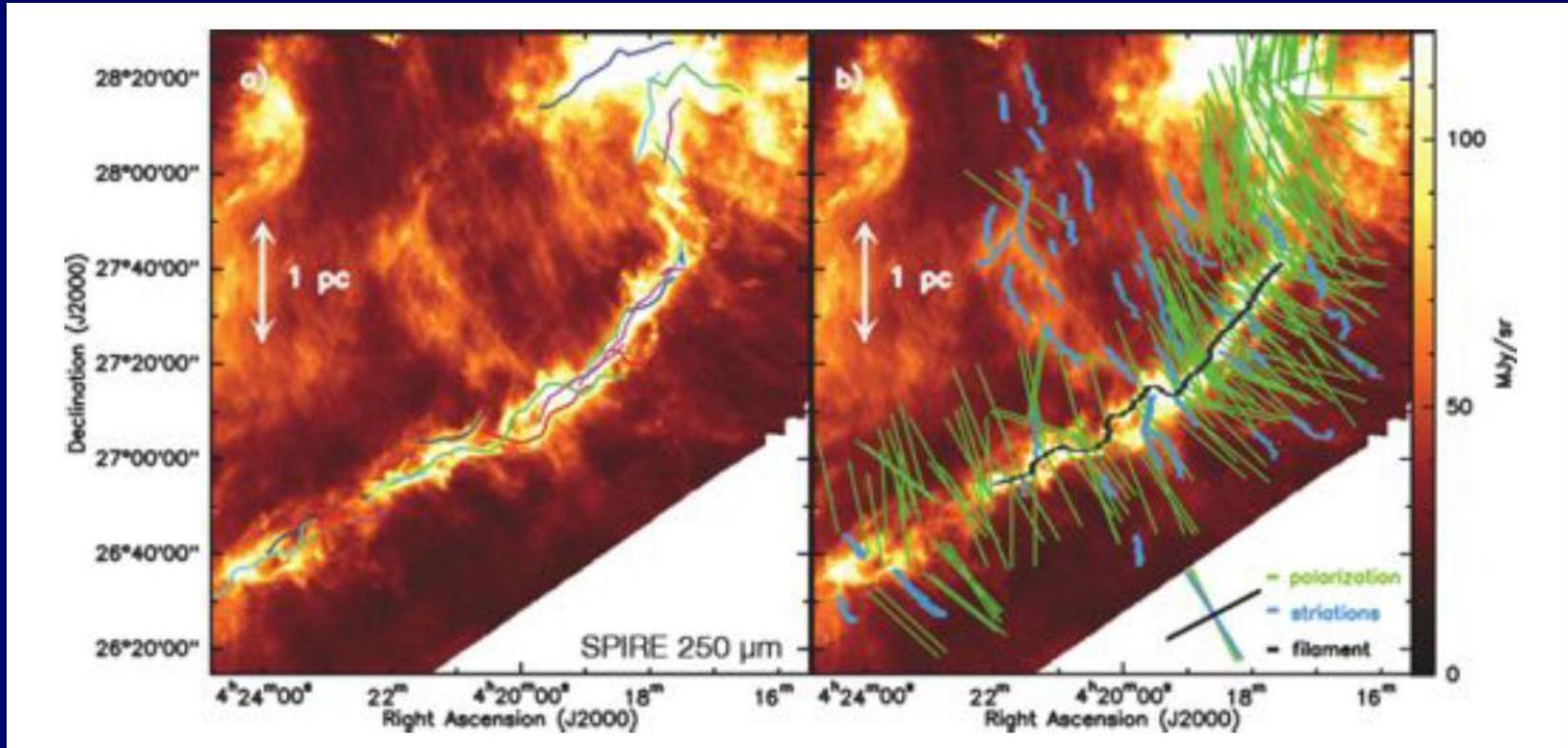
Distance relation



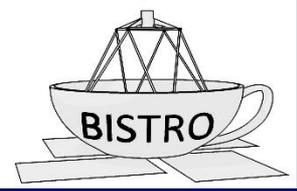
W-T et al.,
2016,
MNRAS,
463, 1008



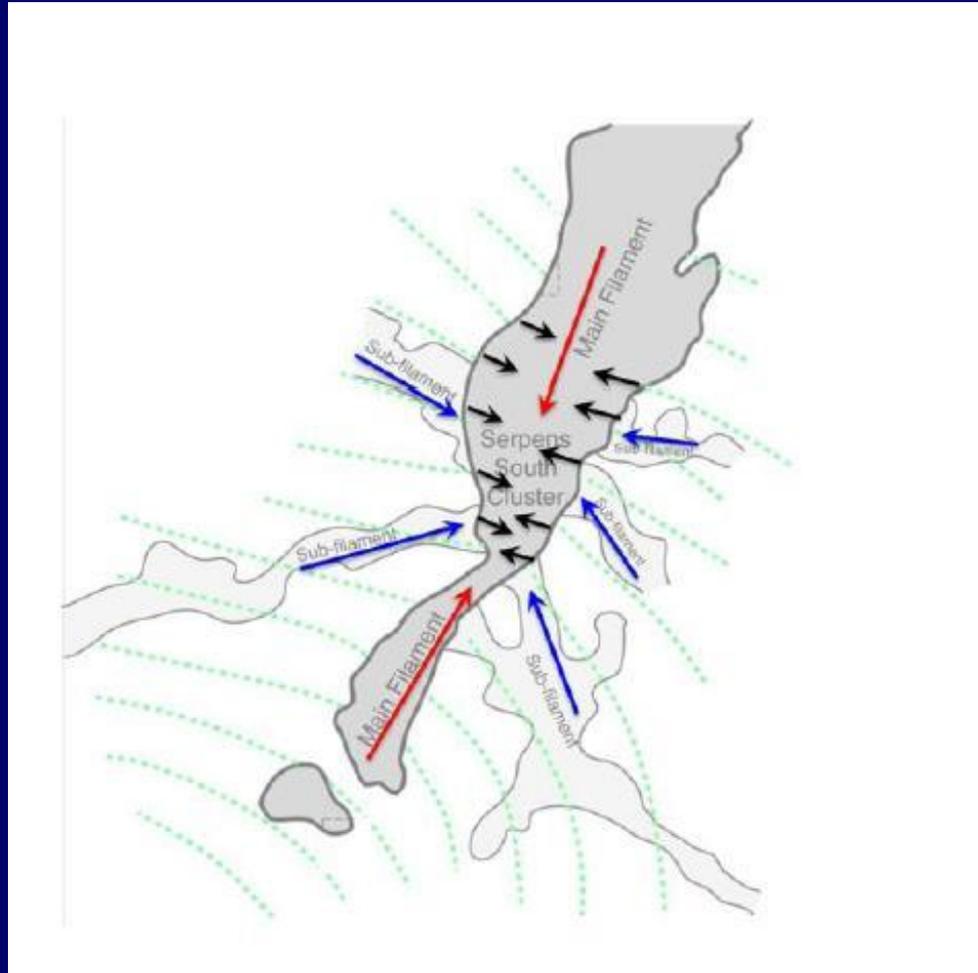
Ground-shifting paper



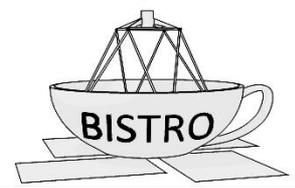
Palmeirim et al., 2013, A&A, 550, A38



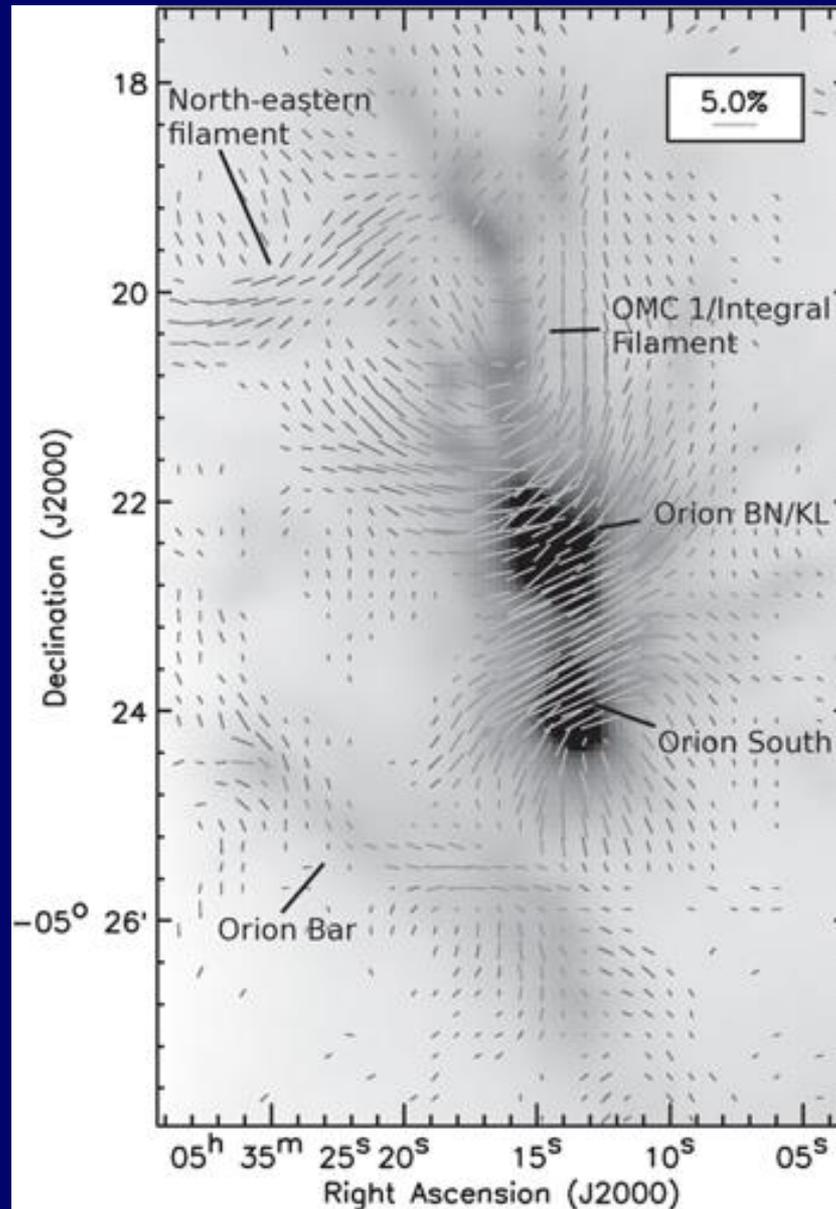
The Herschel paradigm



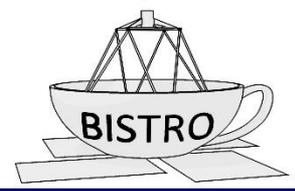
Andre et al., 2014,
PPVI, pp.27-51



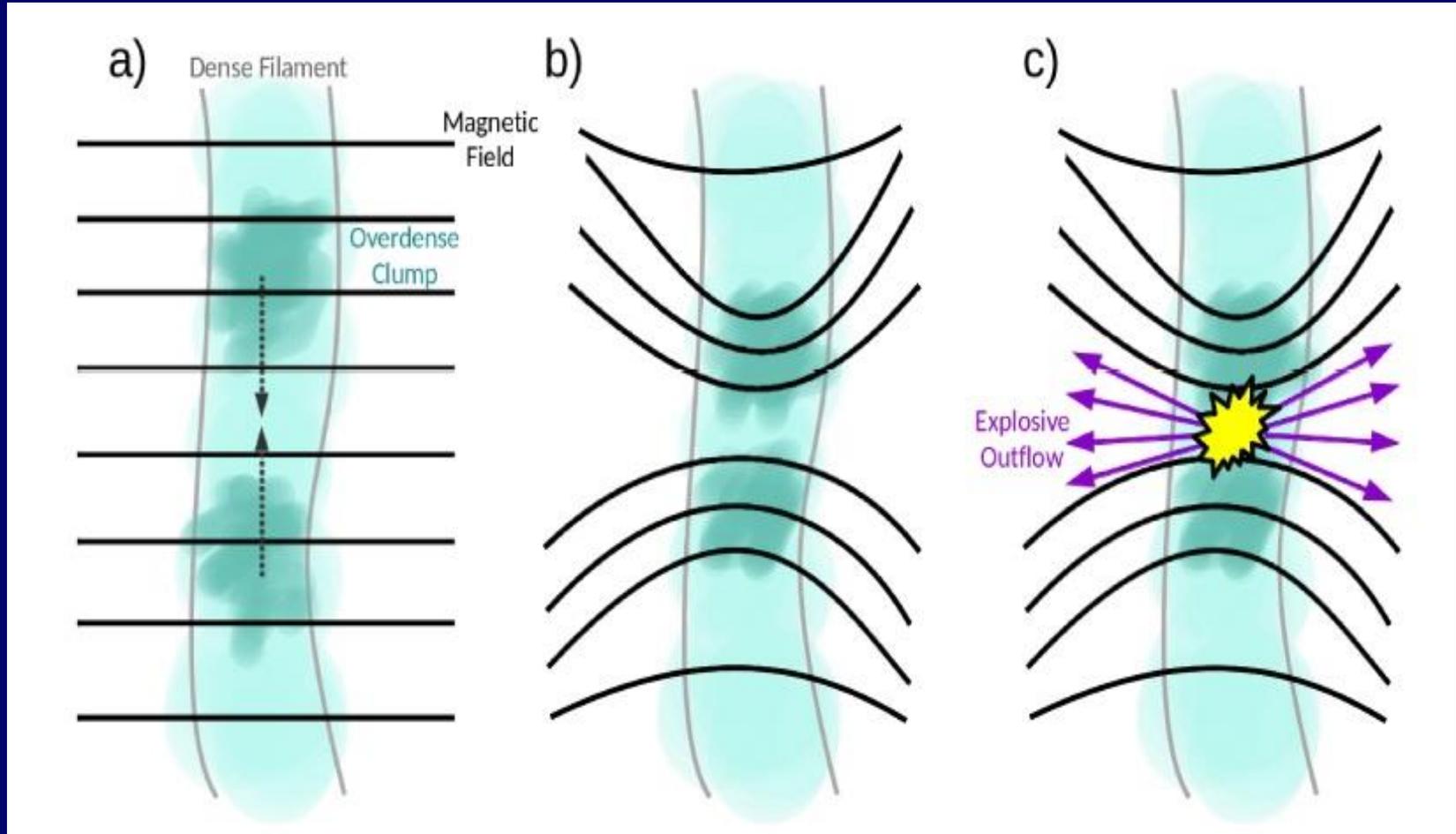
Orion A



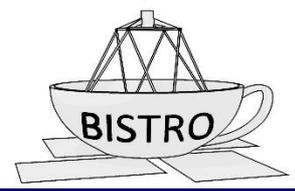
Ward-Thompson
et al 2017
ApJ 842, 66



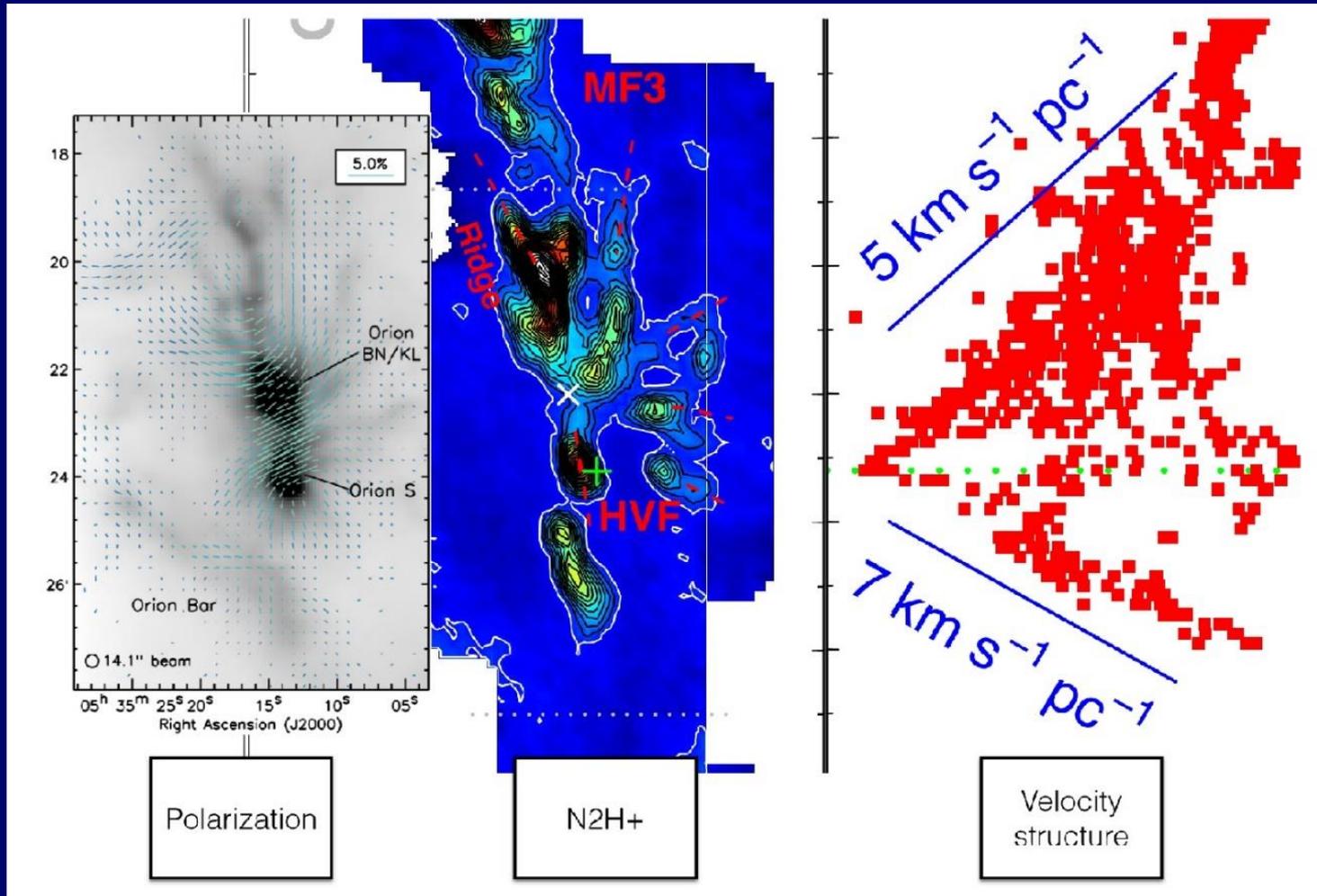
A magnetic 'spring'



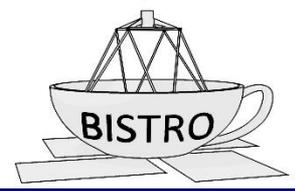
Pattle et al 2017, ApJ, 846, 122



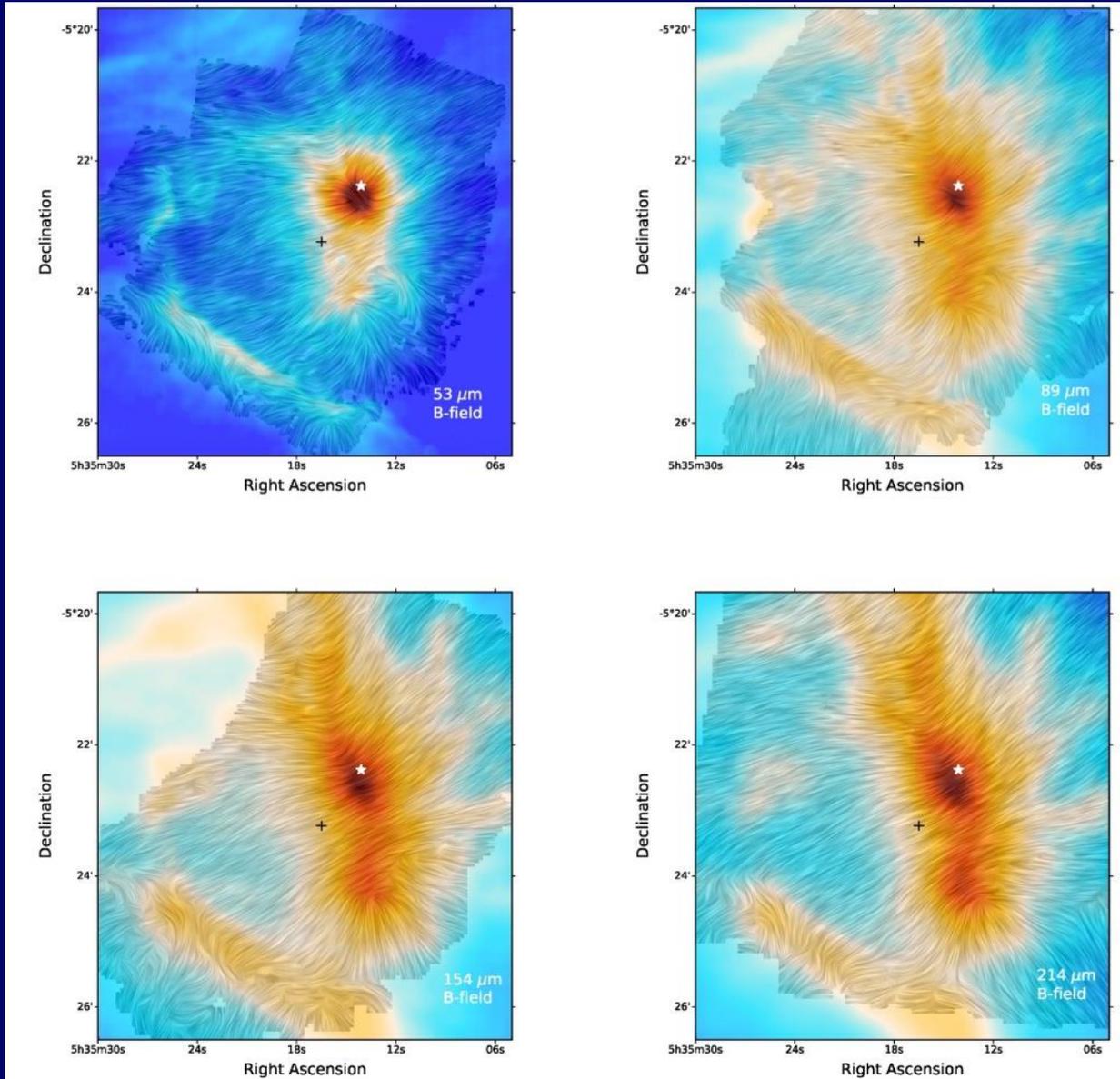
Observed velocities



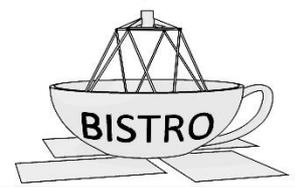
Hacar 2018 (priv comm); Hacar et al 2017 A&A 602, L2



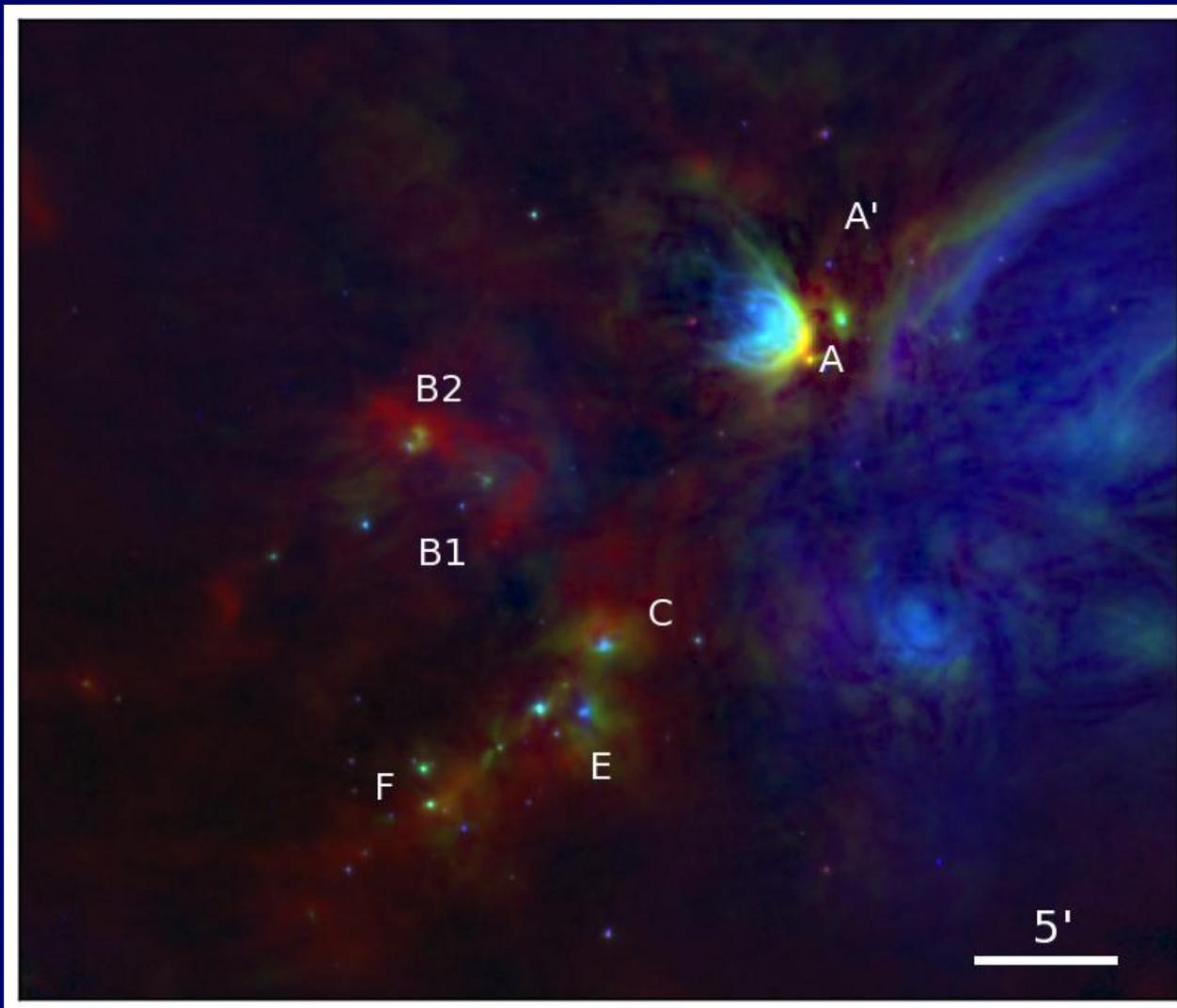
Orion A with SOFIA



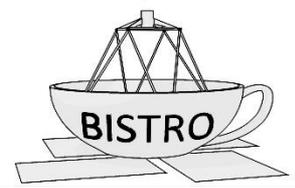
Chuss et al., 2019,
ApJ, 872, 187



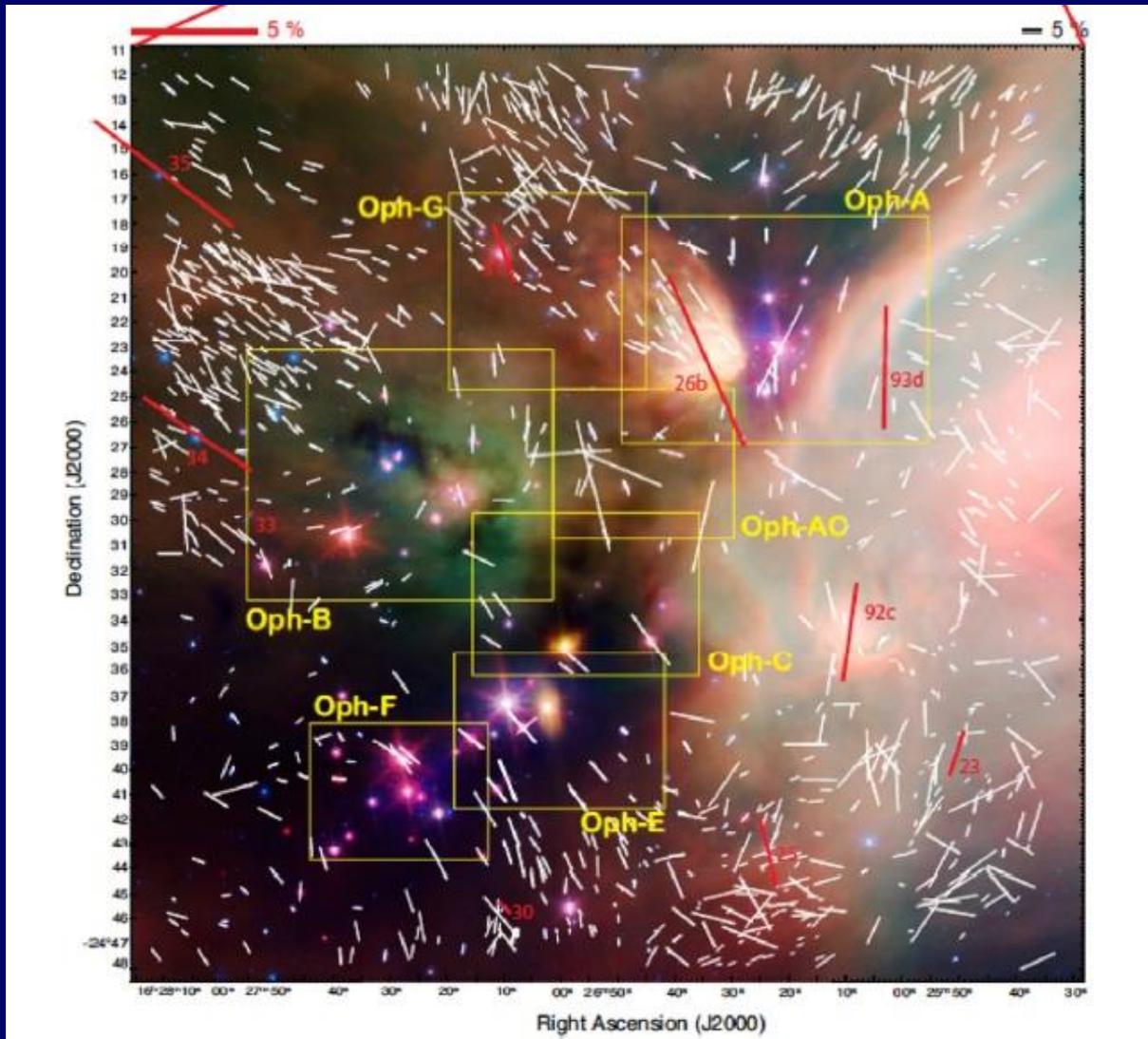
Ophiuchus – L1688



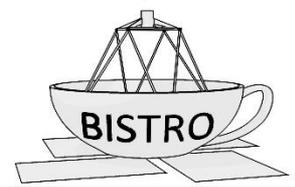
Pattle et al.
2015,
MNRAS,
450, 1094



NIR Polarisation



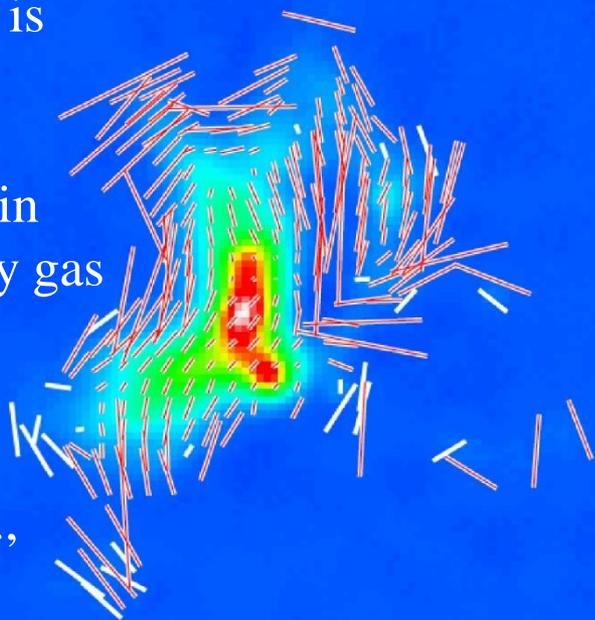
Kwon et al
2015, ApJS,
220, 17



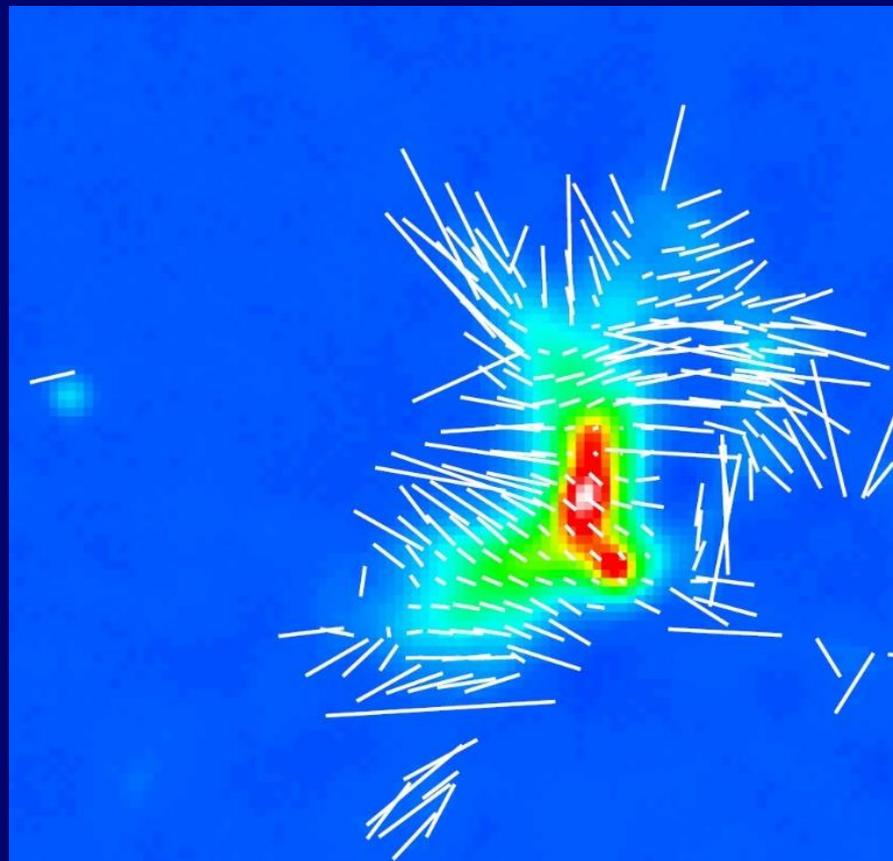
Oph A

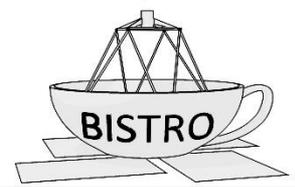


B-field in low density gas is parallel to ambient, but curved in high density gas

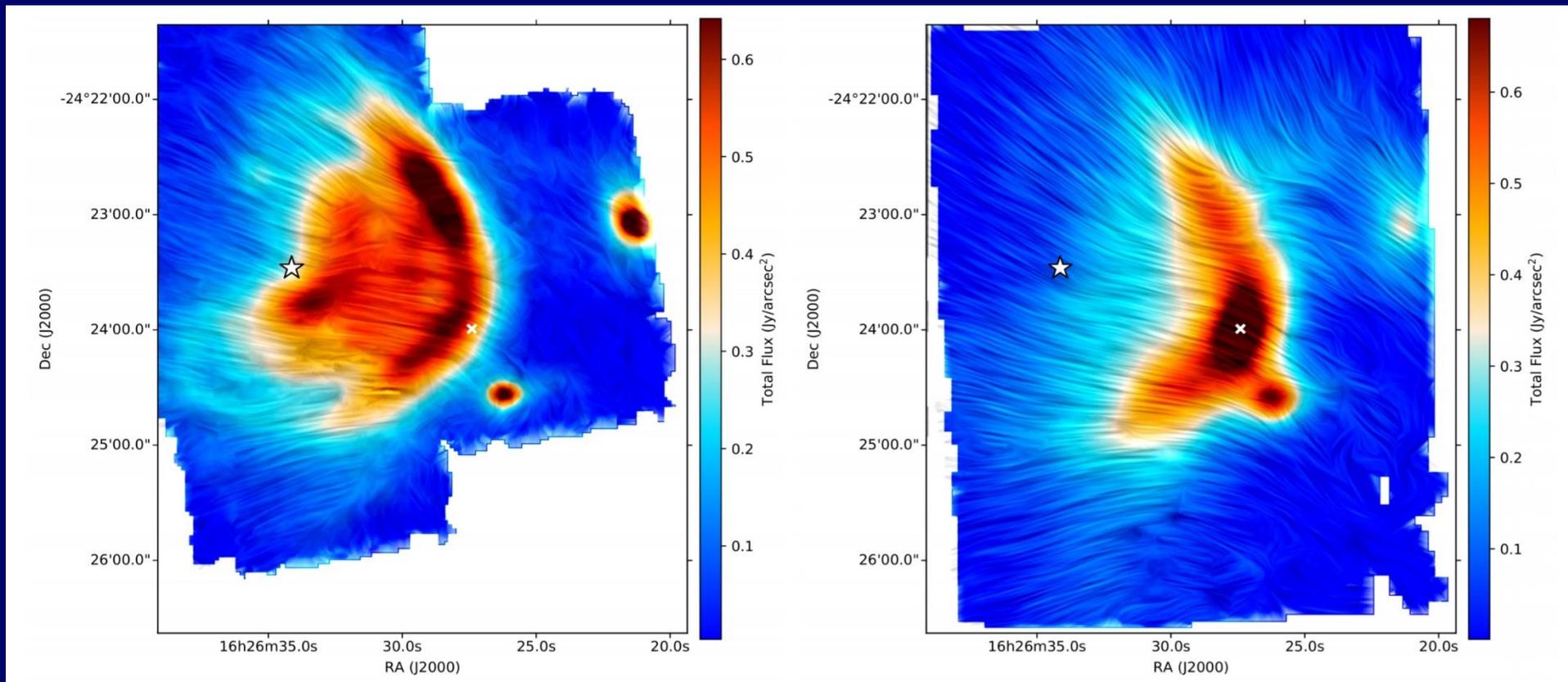


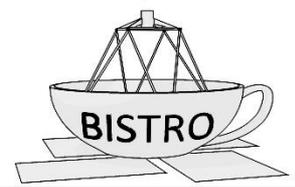
Kwon et al., 2018, ApJ, 859, 4





SOFIA



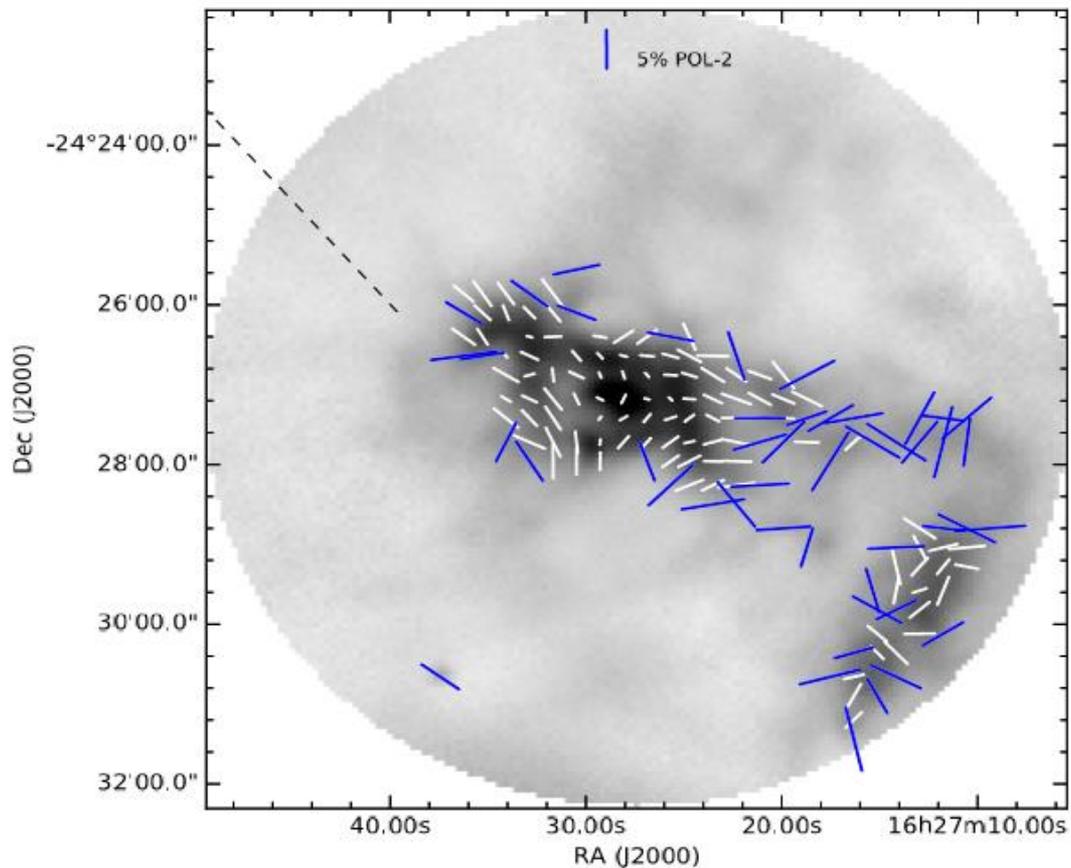


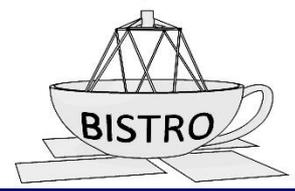
Oph B



Field more disordered, but parallel to ambient in east, orthogonal in west

Soam et al., 2018, ApJ, 861, 65



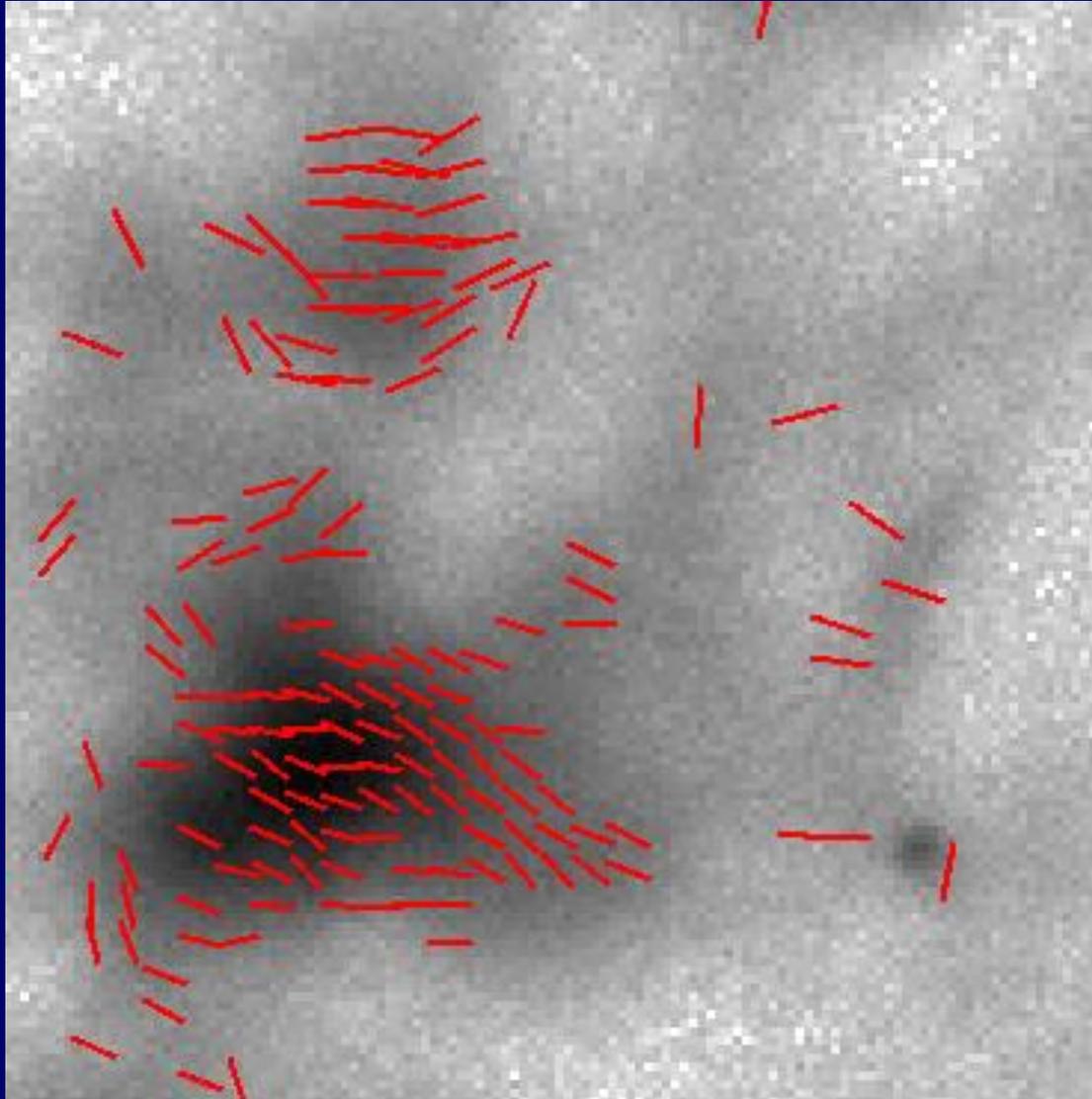


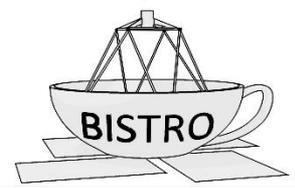
Oph C



Field
parallel to
ambient in
south,
rotated in
north

Liu et al., APJL,
2019, in press,
arXiv:
1902:07734





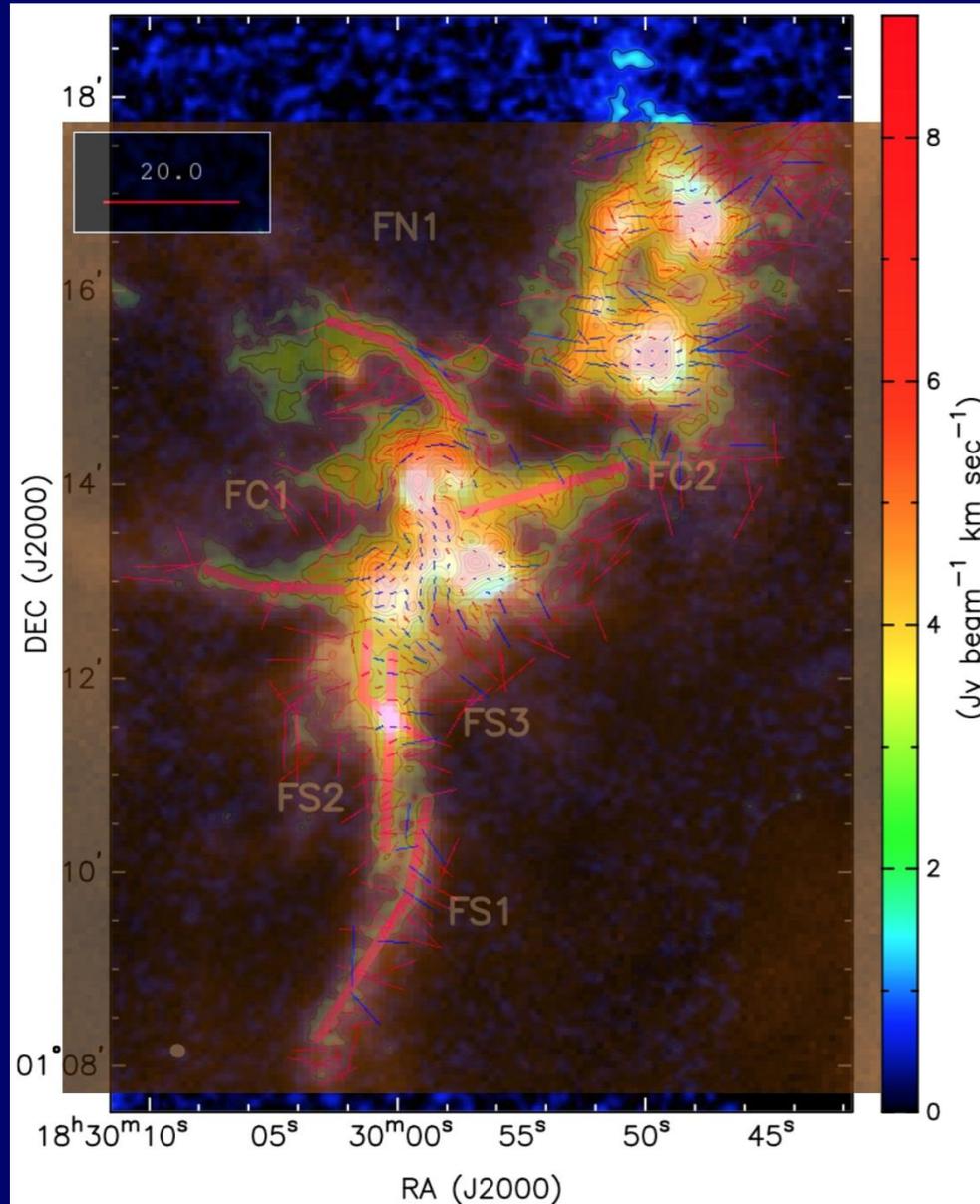
Serpens Main



Vectors show
field (blue $>3\sigma$
red $>2\sigma$)

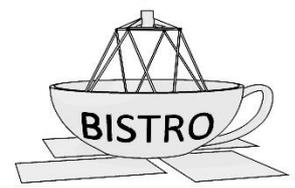
Field perp to
filaments

%age pol.
reduces in
high density
regions

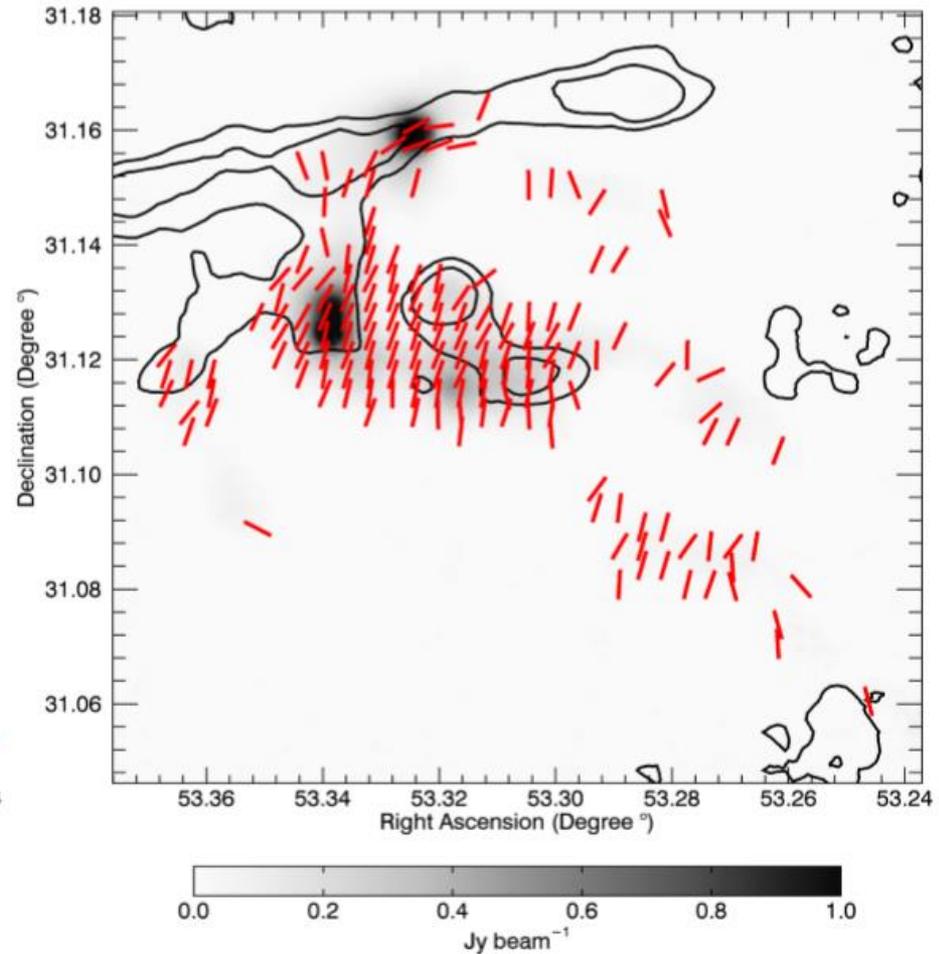
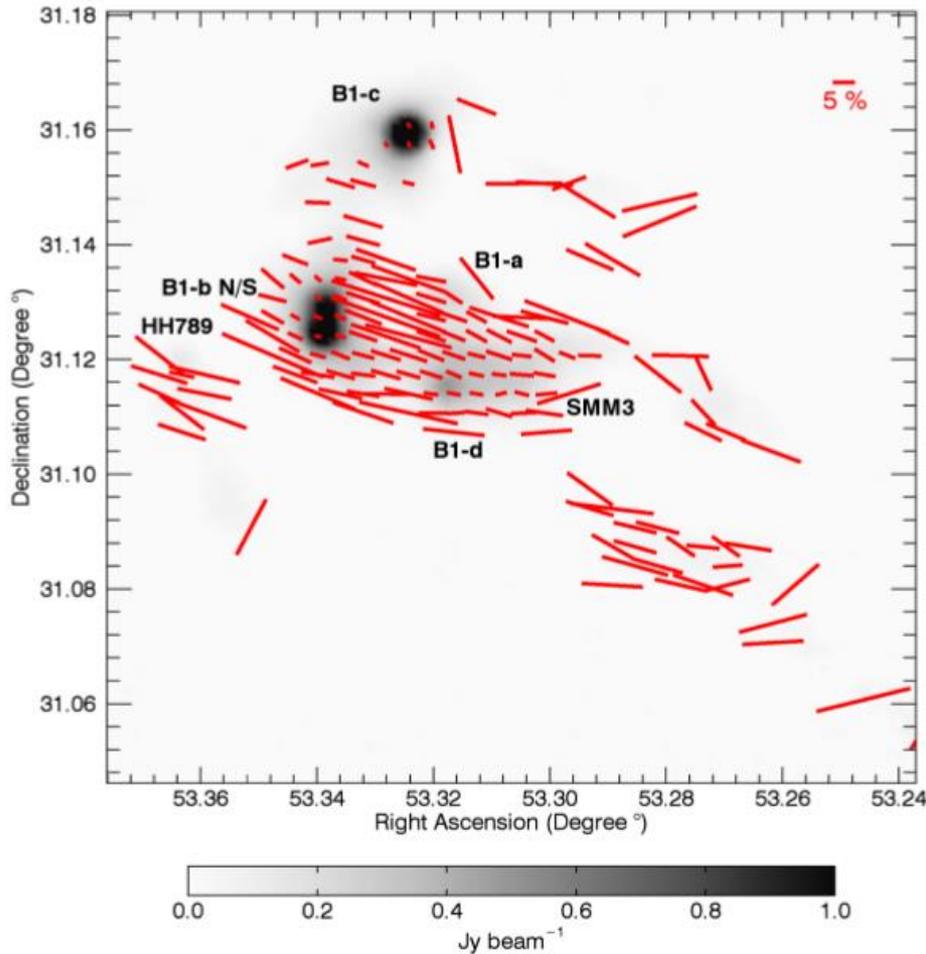


W Kwon
et al., 2019
in prep

N₂H⁺ CARMA
image from
Lee, Kwon
et al., 2014

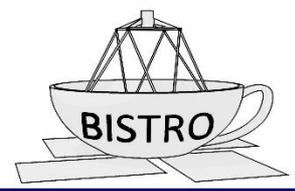


Perseus B1



Coudé et al, 2019, ApJ, in press, arXiv:1904.07221

B-field $\sim 120 \pm 60 \mu\text{G}$



L1689B

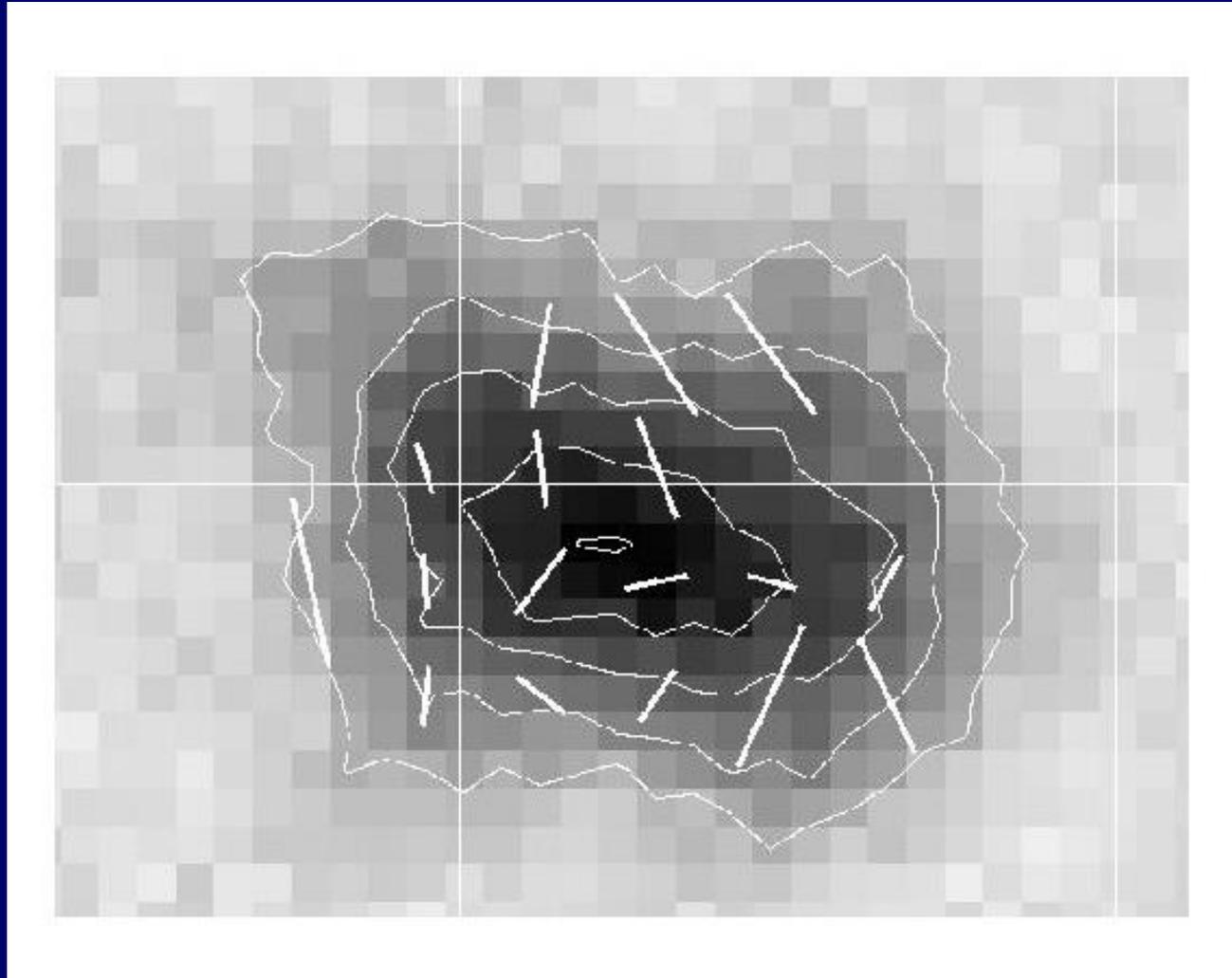


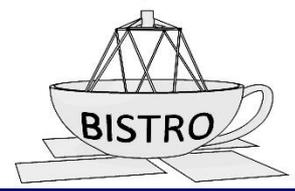
Faintest
object so far
observed.

Field roughly
north-south,
rotates in
centre.

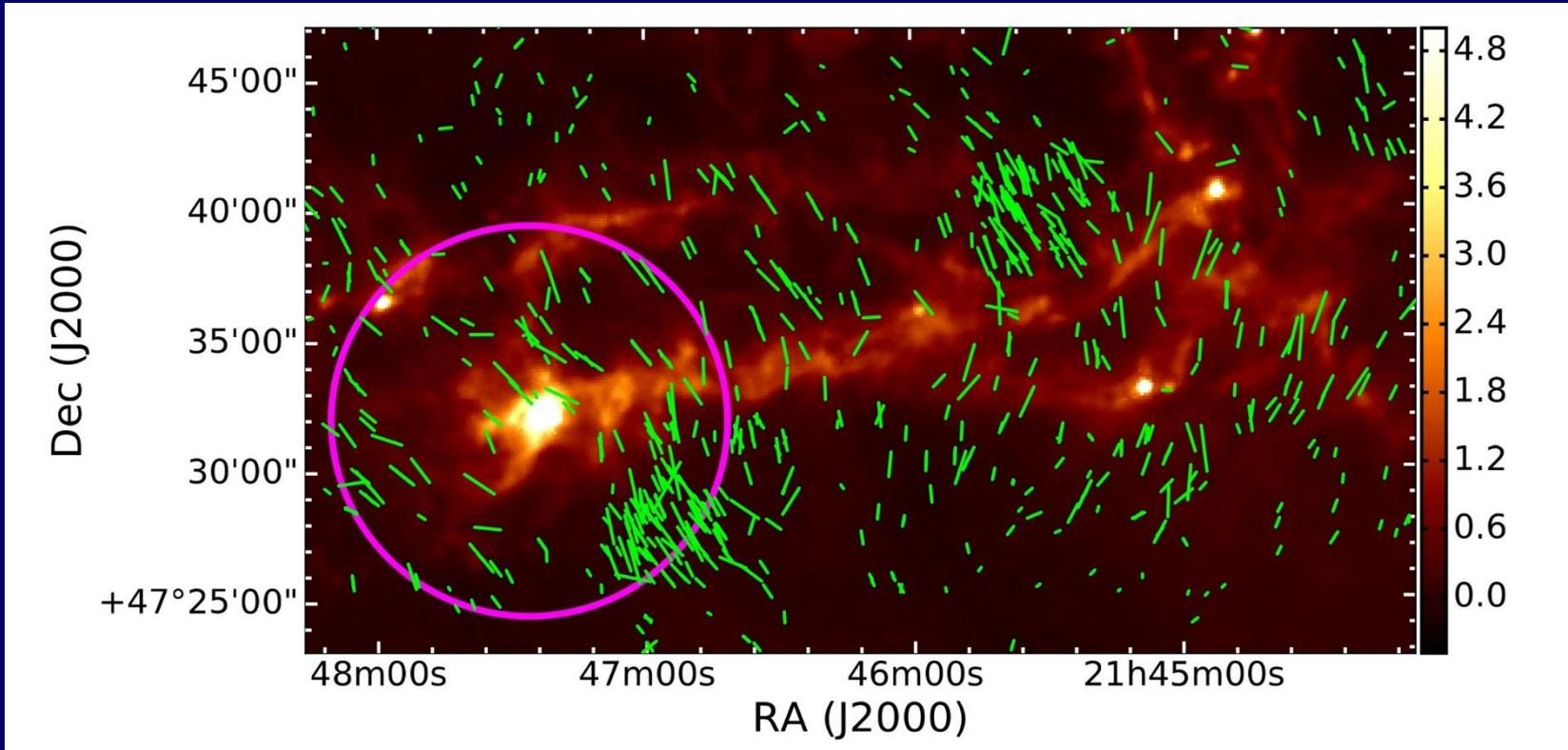
Perp. to
core/filament.

Ward-
Thompson
et al.,
2019, in prep

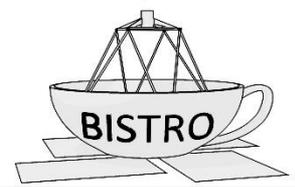




IC5146 – Another filament



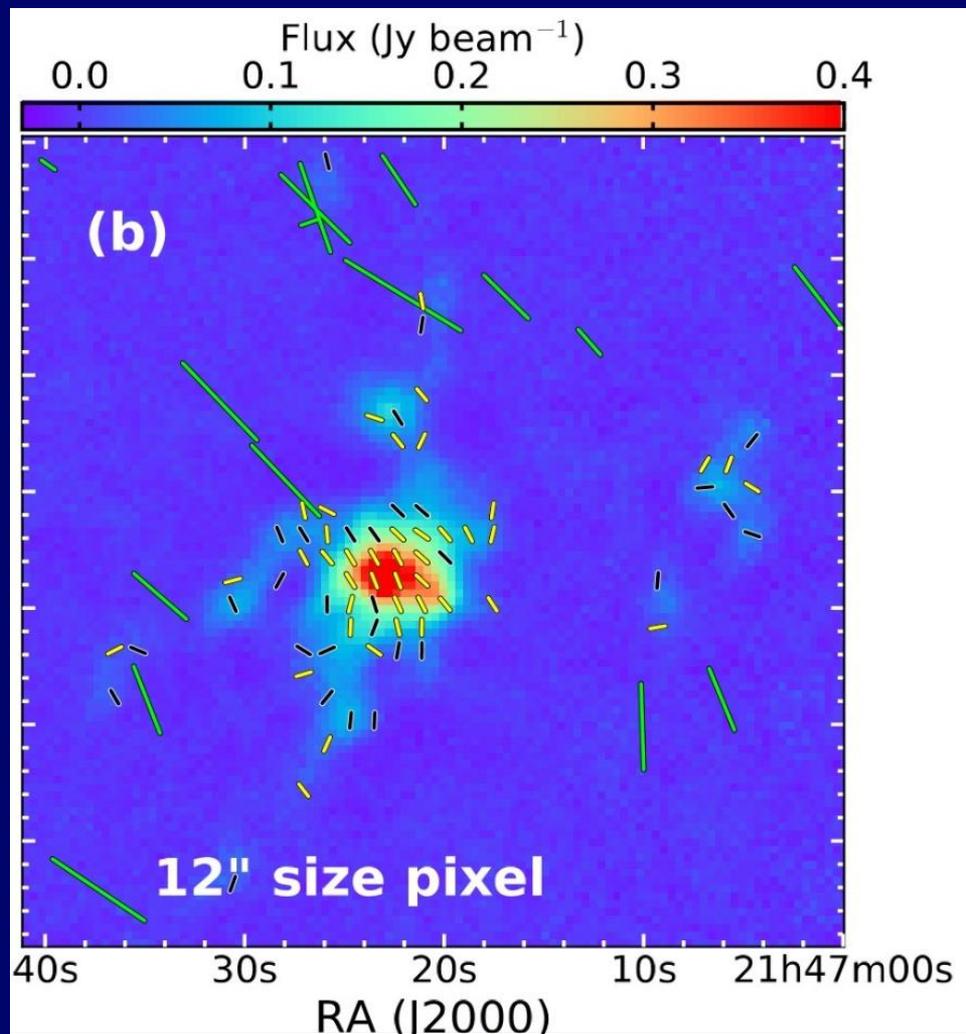
IR poln. – Wang et al., 2019, ApJ, 876, 42



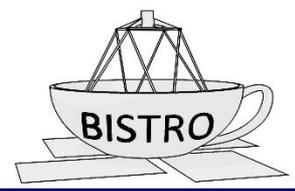
IC5146 – Hub



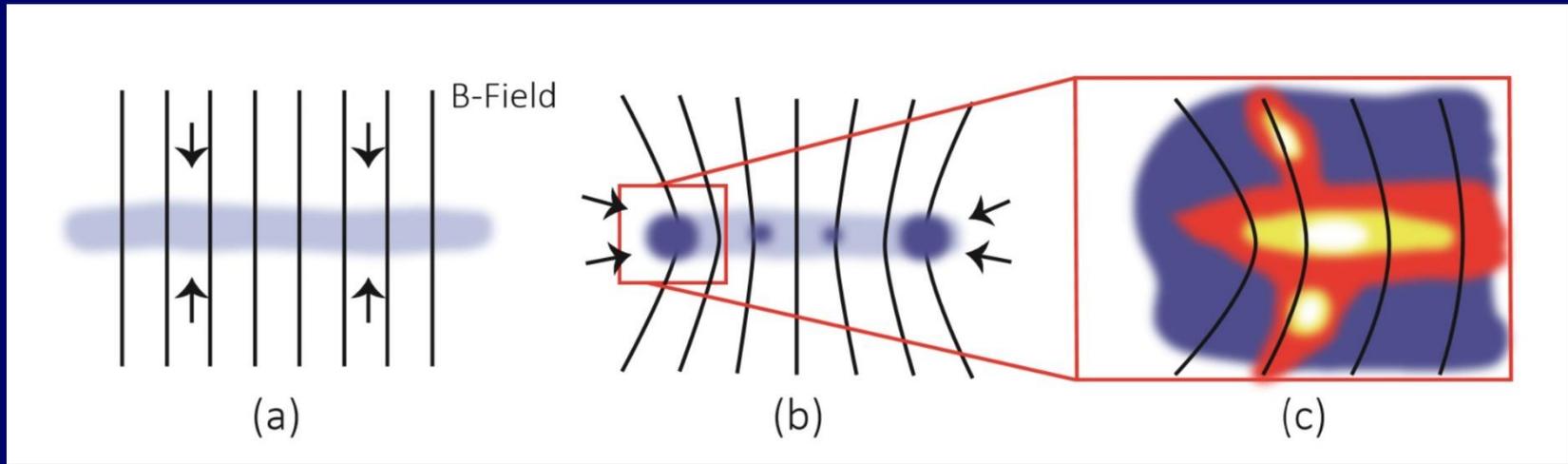
A hint of a
turn in centre
of Hub



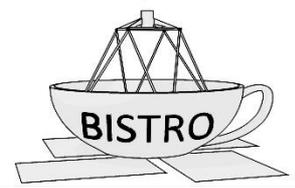
Wang et al., 2019, ApJ, 876, 42



Cartoon of IC 5146



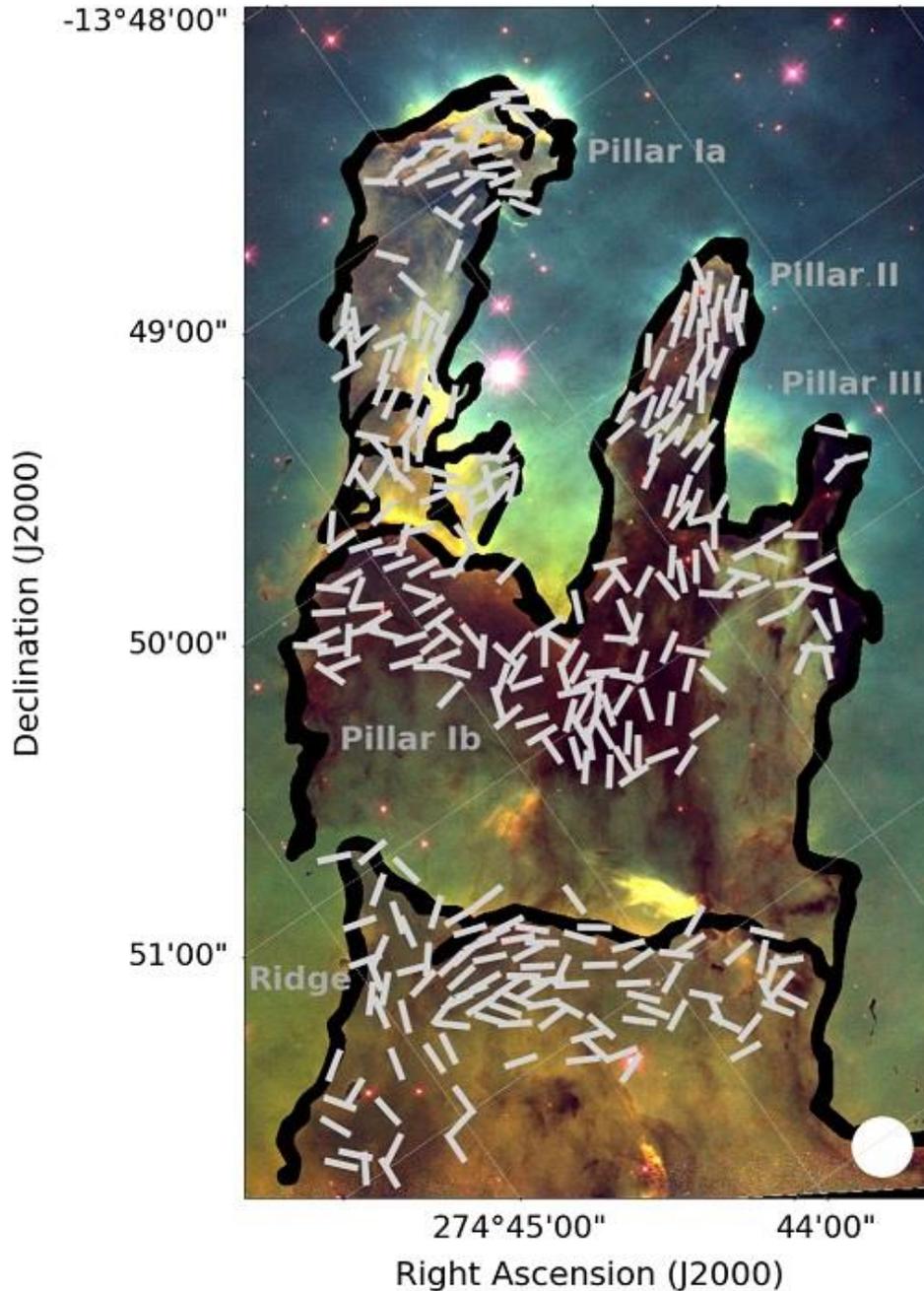
Is IC 5146 like the Orion filament? (Wang et al., 2019, ApJ, 876, 42)

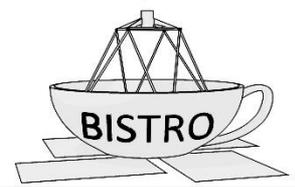


B-fields in the 'Pillars of Creation' of M16

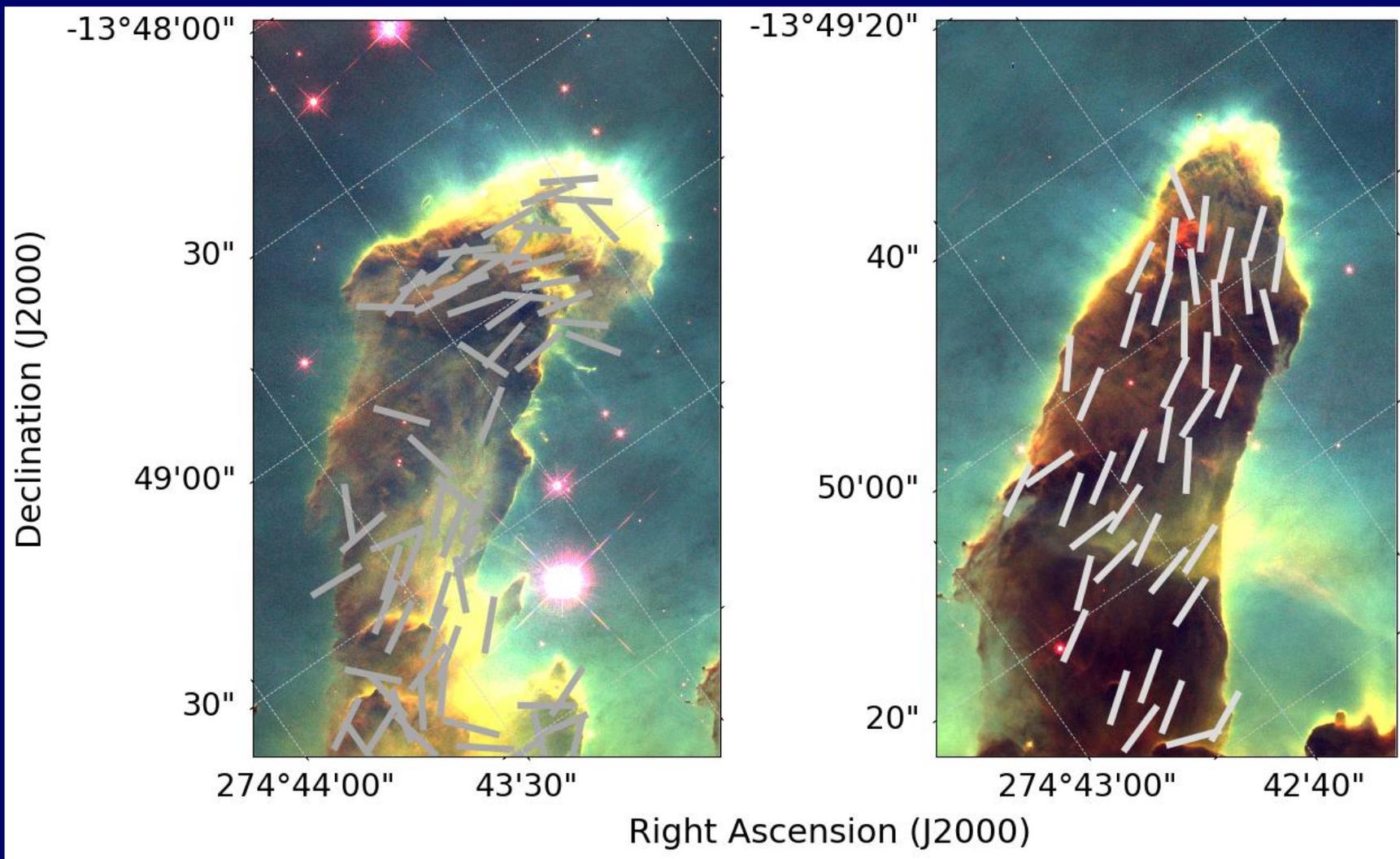
Pattle et al.,
2018, ApJL,
860, L6

THE MAGNETIC FIELD OF THE PILLARS OF CREATION





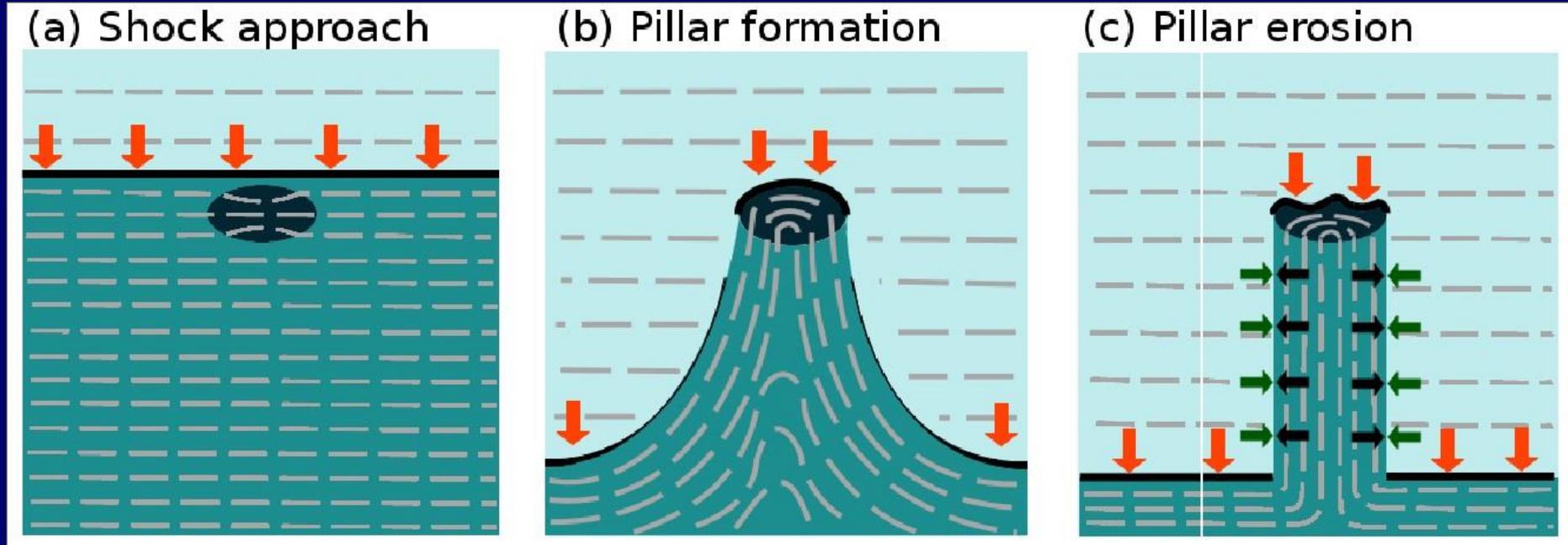
B-field details



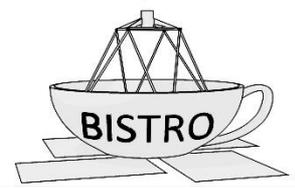
Pattle et al, 2018, ApJL, 860, L6



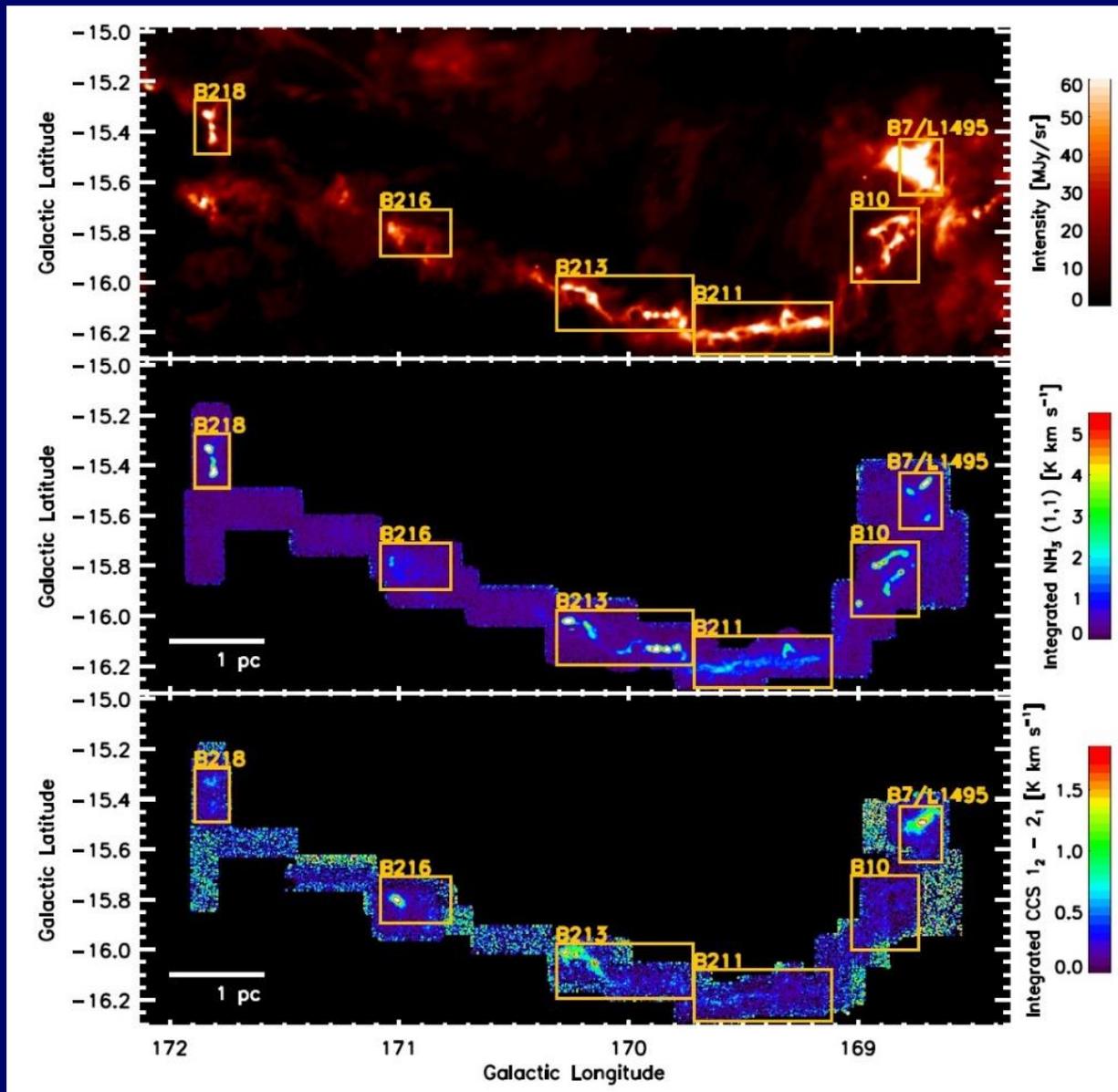
Pillar evolution



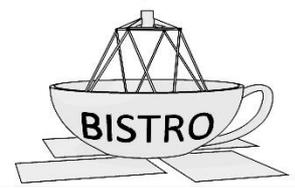
Pattle et al, 2018, ApJL, 860, L6



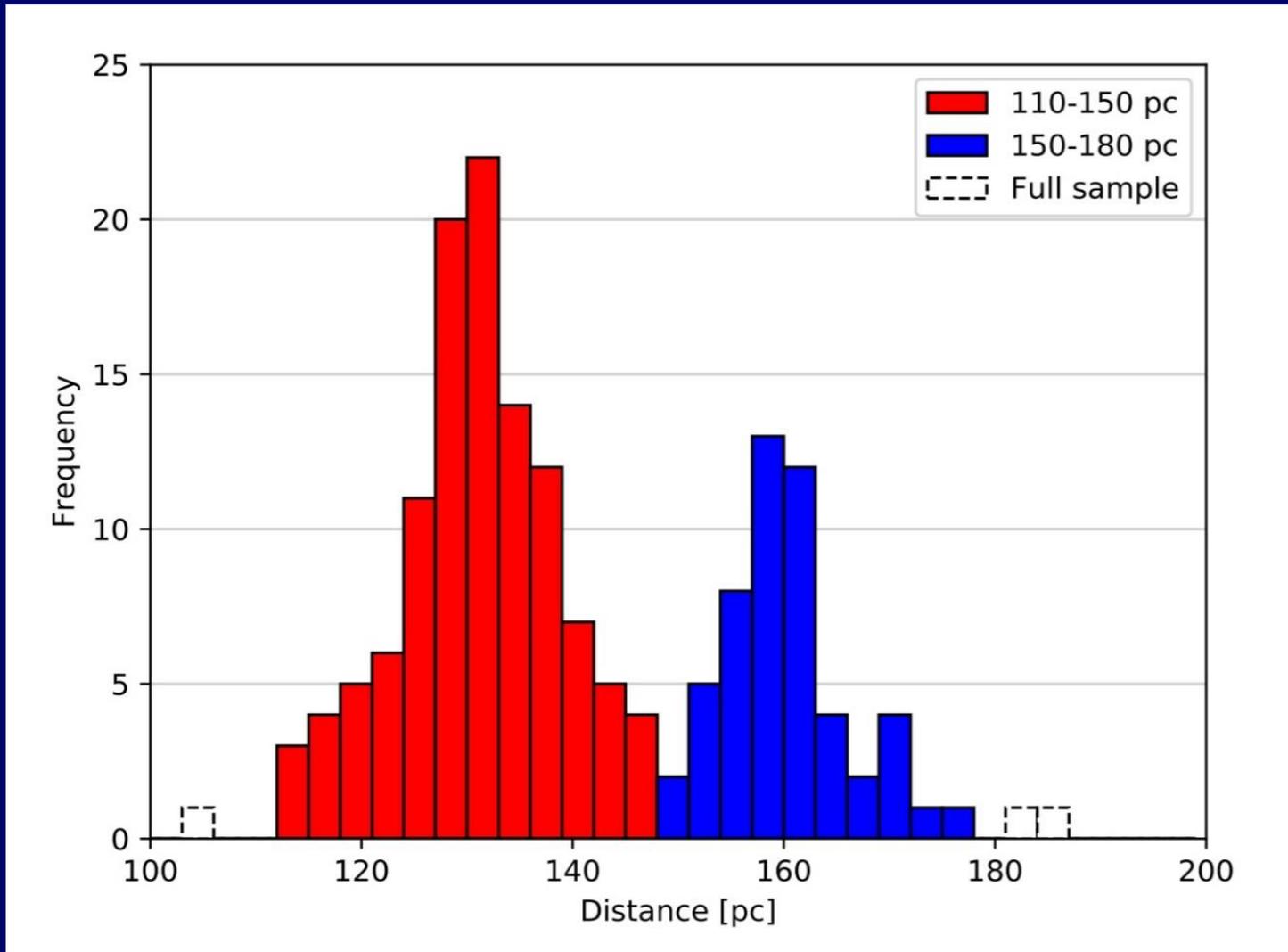
GAS & KEYSTONE



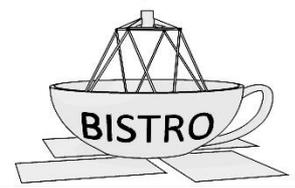
Seo et al., ApJ.,
871, 134



GAIA



Fleming
et al., 2019,
ApJ,
submitted,
arXiv:
1904.06980



Summary

