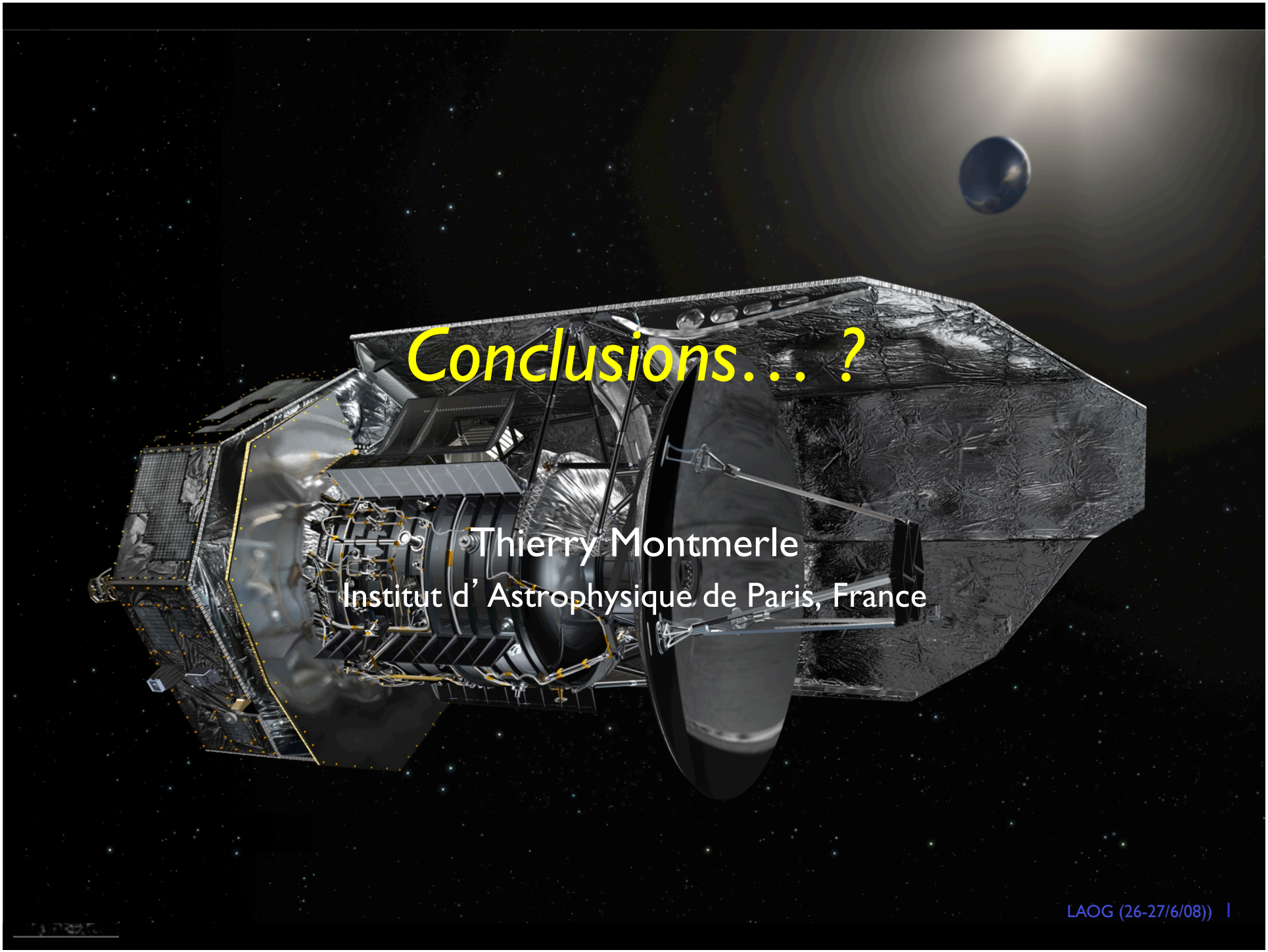


Conclusions… ?

Thierry Montmerle
Institut d' Astrophysique de Paris, France

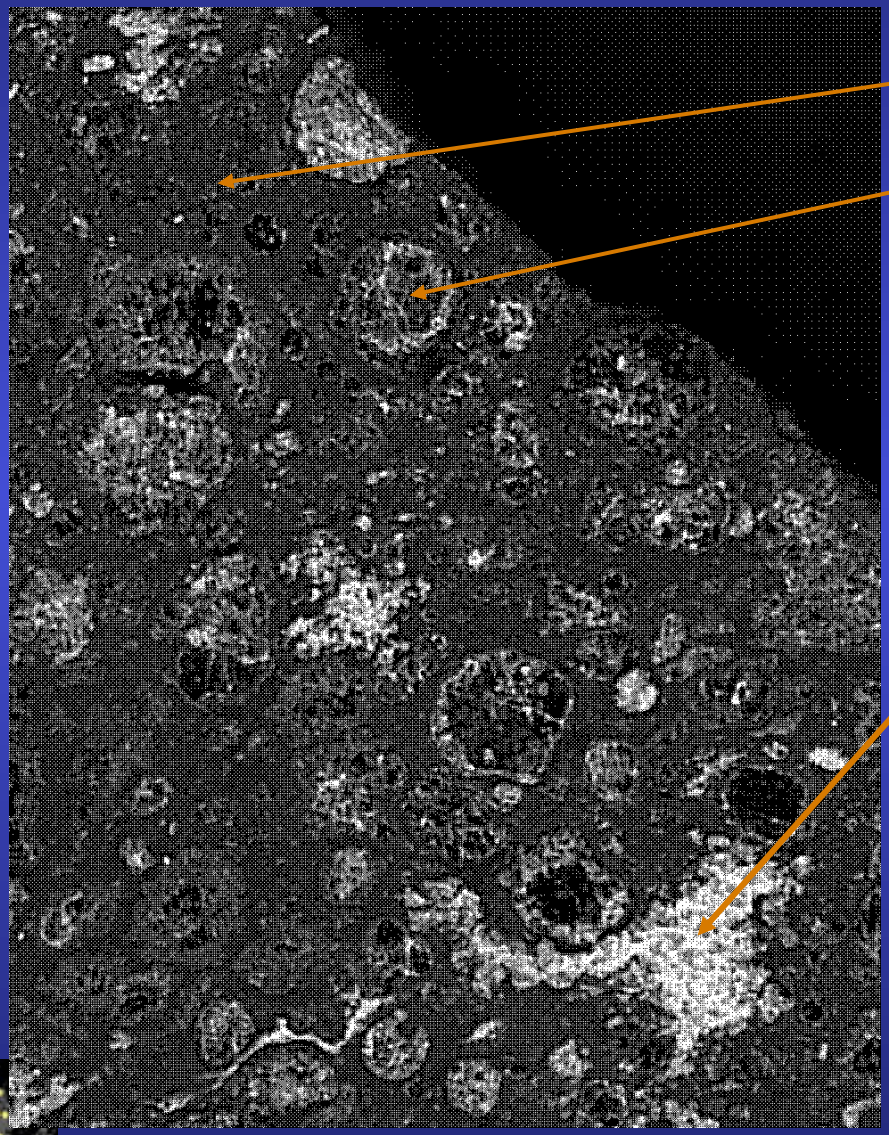
Some statistics…

- 222 registered participants
  - 62 women (28 %)
  - large young population, many PhD students
- 53 oral papers
- 114 posters
  - ~ 50% "blitz presented"
- 7.5h x 3.5d = 36 hrs in session
- => ~ 1500 slides !

From pebbles to atoms…
to nuclei

(a personal view)

The young solar system: "extinct radioactivities" problem in meteorites



Matrix

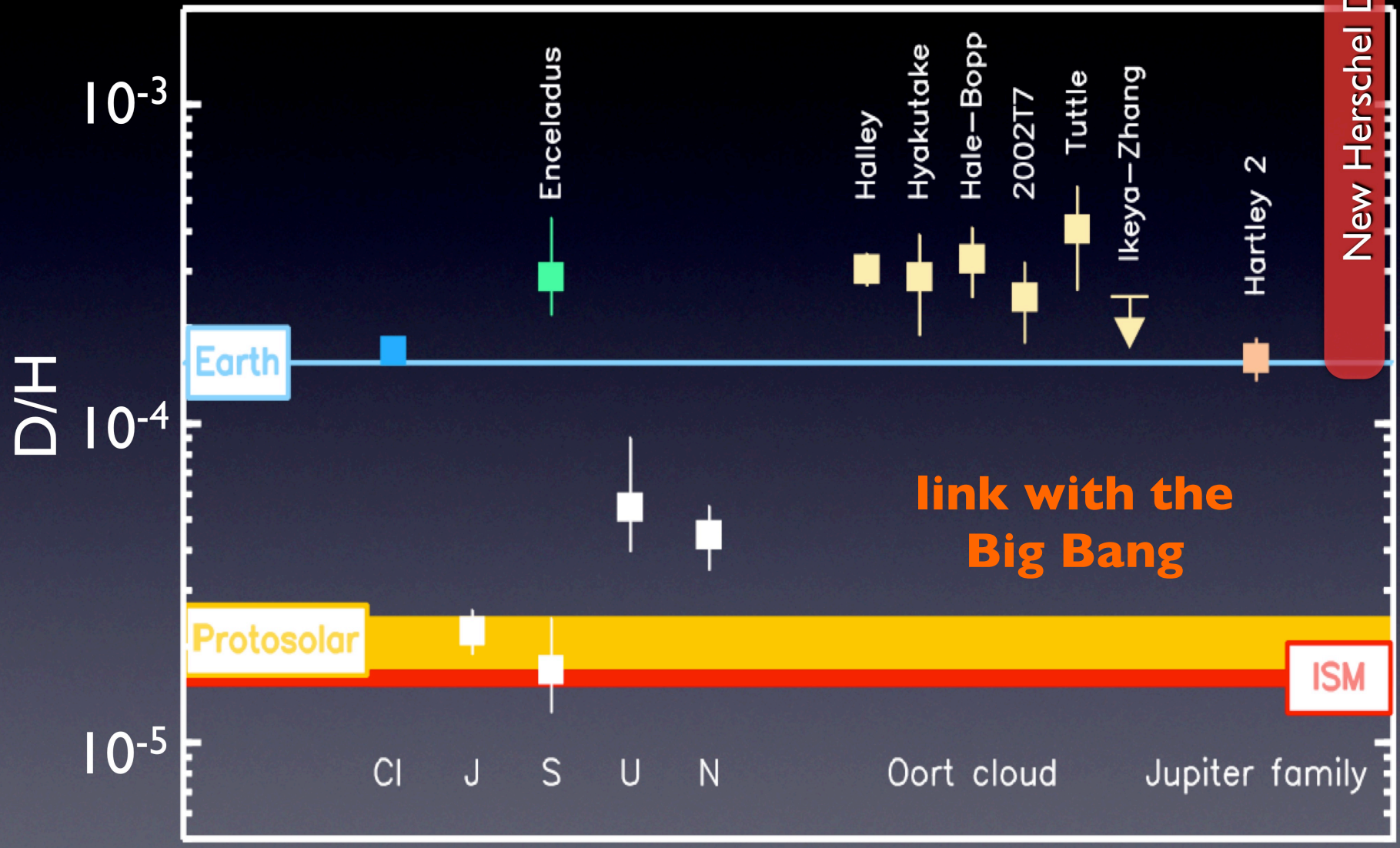
Chondritic grains

« Calcium-Aluminium Inclusions» (*CAIs*):
= radioactive disintegration of isotopes
^{7}Be ^{10}Be ^{26}Al ^{36}Cl ^{41}Ca ^{53}Mn ^{60}Fe
("extinct", short-lived radioactivities)

=> Evidence for SN contamination at birth of solar system

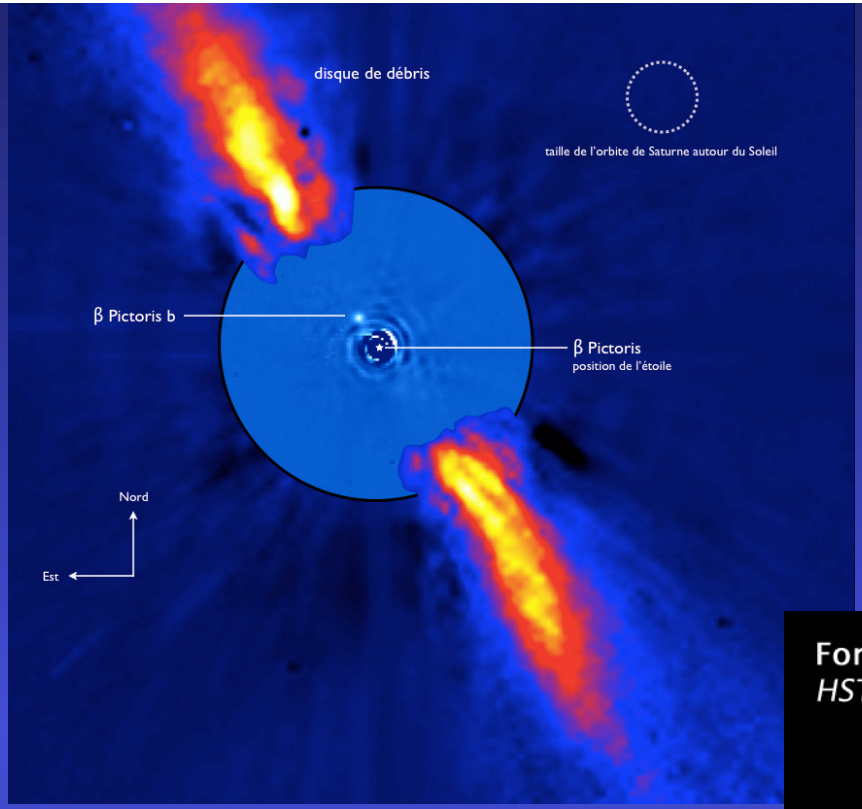
Gounelle, Chaussidon, Shu, et coll.
Allende (Mexico, 1969; ~ 2 tons !)

Solar System D/H Ratios

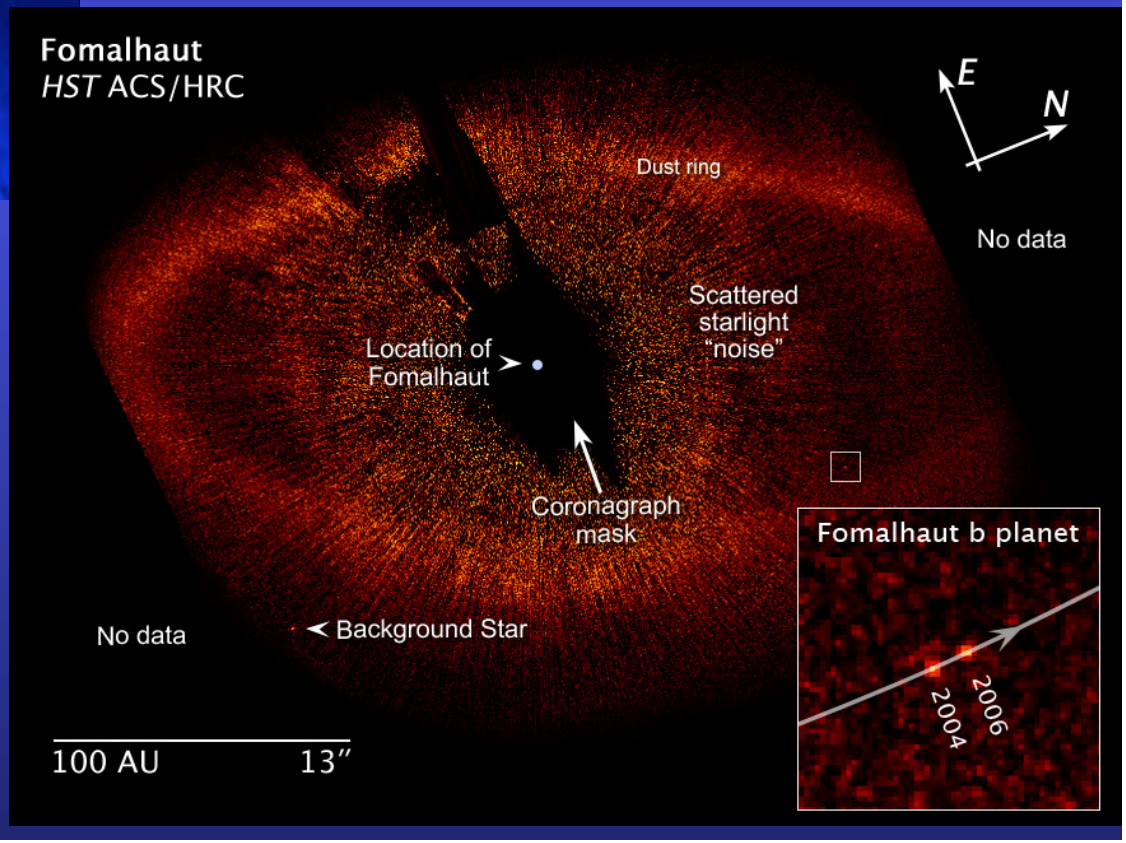


@E. Bergin

Hartogh et al. 2011, *Nature*, Oct. 5



Planets in debris disks: ~ gas giants in the early SS



@S. Botinelli

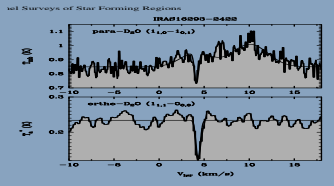
HDO, D_2O

Coutens+2012

Vastel+2010

at 607.35 GHz

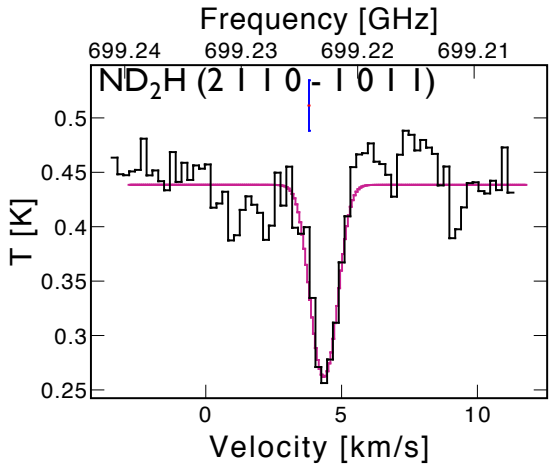
Protostellar core chemistry: Deuteration !

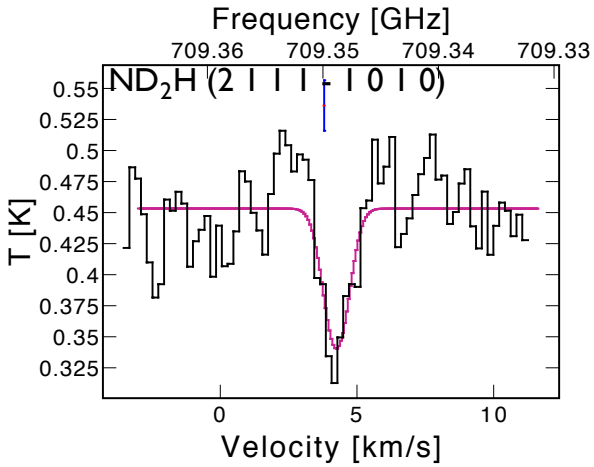


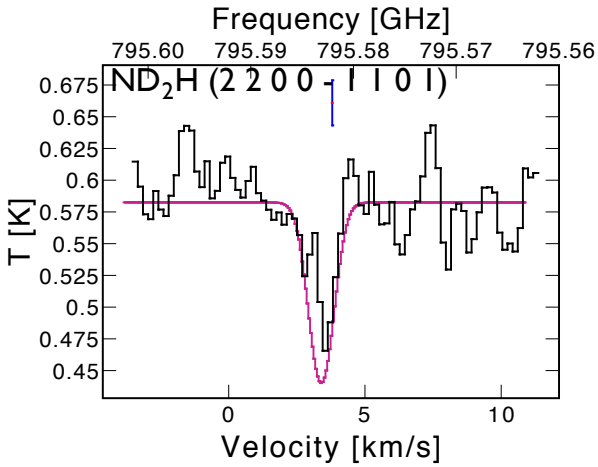
- HDO/H_2O ~ 3.5%, 0.5% and 4.5% in hot corino, outer envelope and photodesorption layer (p.d.l.), resp.
- ≥ 10× ratio in Earth's ocean : if confirmed, need a mechanism to explain the decrease of HDO/H_2O from protostars to comets/planets.
- D_2O absorption due to cold+p.d.l. → D_2O/H_2O ~ 0.1-4×10^{-3} and D_2O/HDO ~ 1-10%, consistent with statistical distribution in Butner et al.

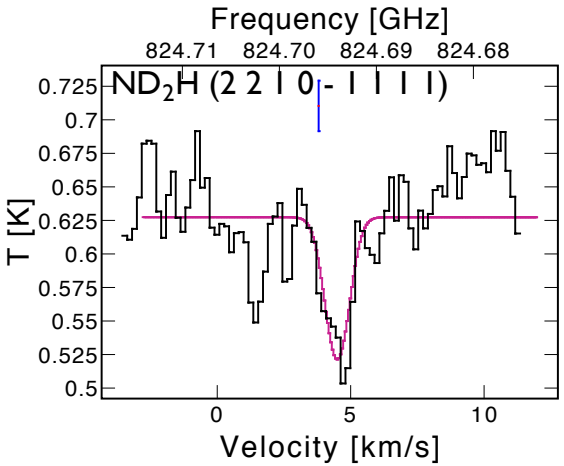
@S. Botinelli

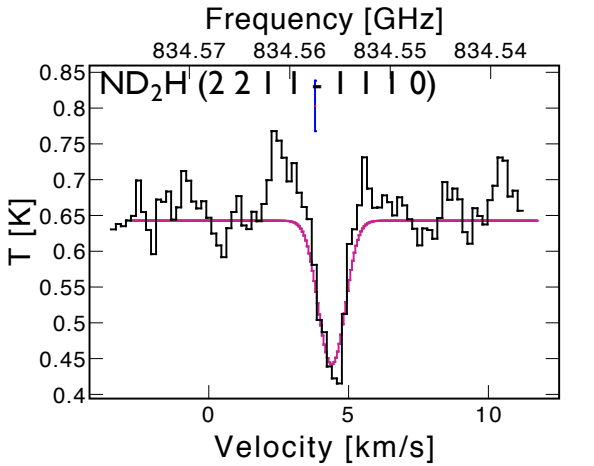
ND_2H (2-1)











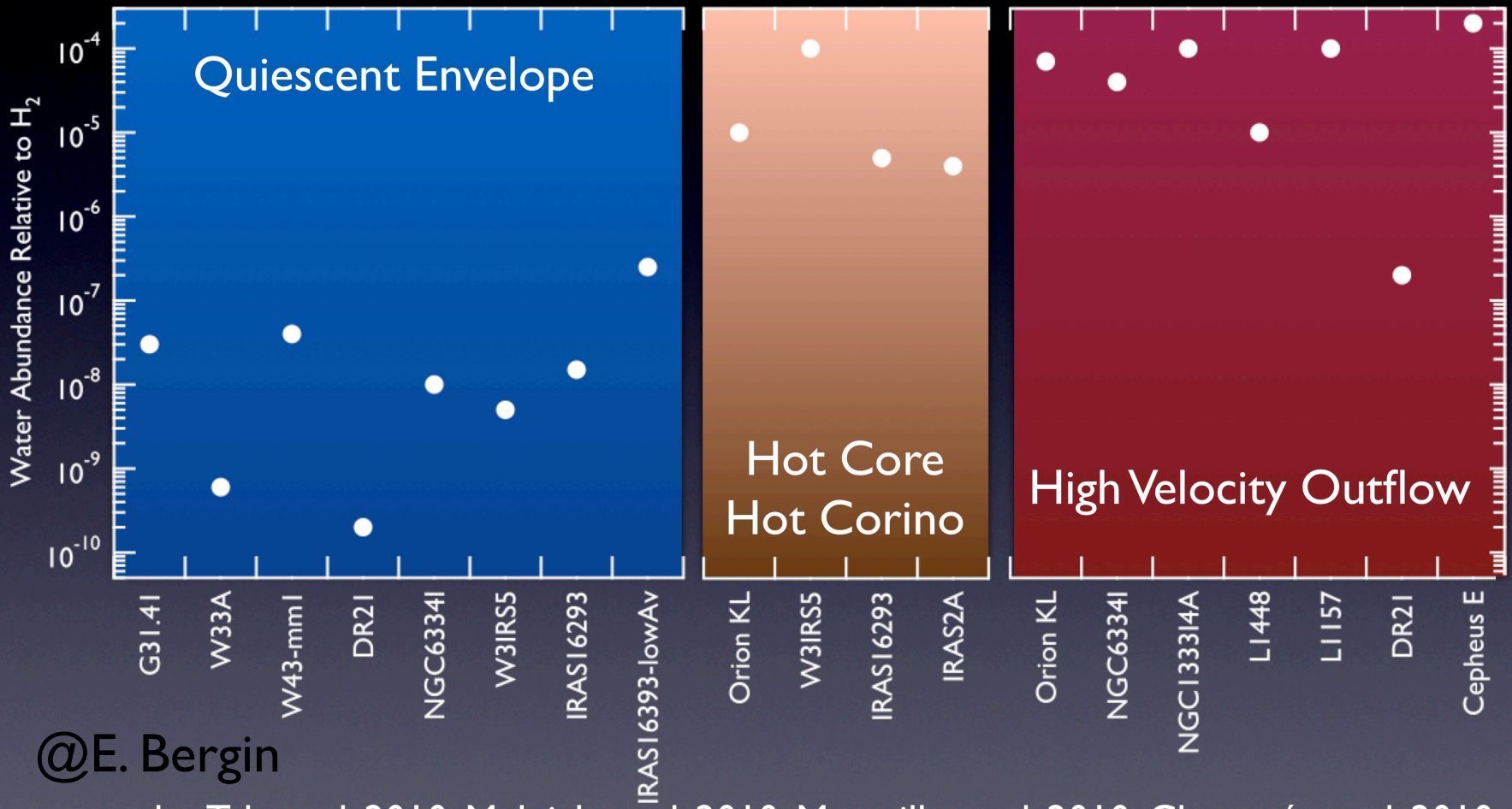
χ^2 minimization:

$N = (0.2 - 3.0) \times 10^{14}$ cm^{-2} ;

$T_{ex} = 3 - 7$ K ;

FWHM = 1.0 - 3.0 km/s

Water Abundance



@E. Bergin

van der Tak et al. 2010; Melnick et al. 2010; Marseille et al. 2010; Chavarría et al. 2010; Emprechtinger et. al. 2010; Nisini et al. 2010; Kristensen et al. 2010, 2011; Lefloch et al. 2011; Coutens et al. 2012; Santangelo et al. 2012; Vasta et al. 2012

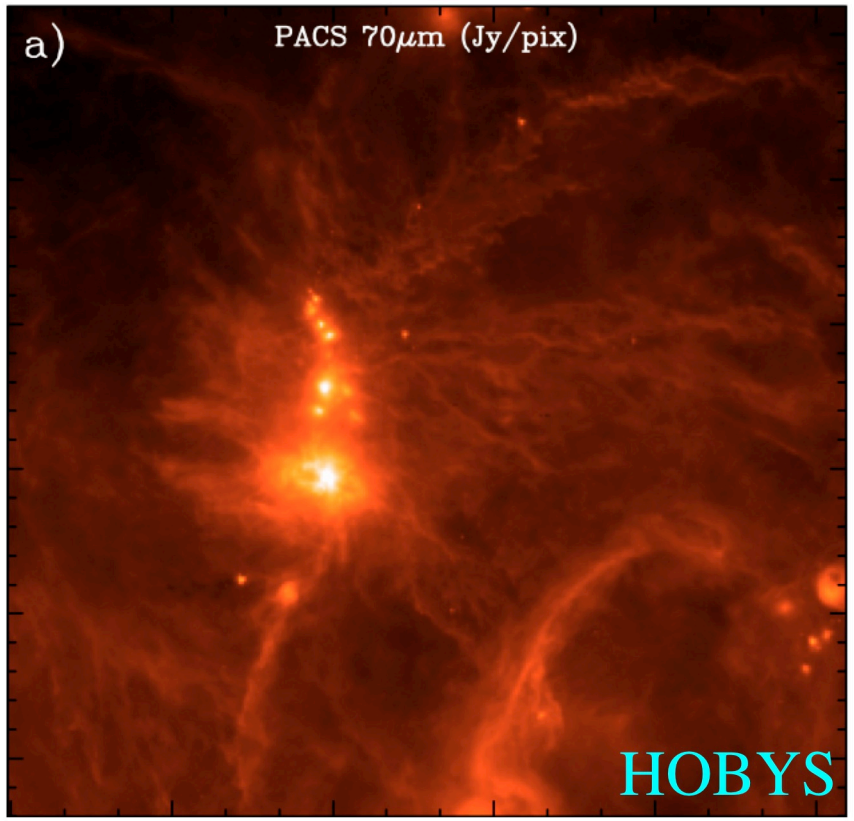
Very common pattern: main filament + network of perpendicular striations or "sub-filaments"

Taurus B211 filament: M/L ~ 50 $M_\odot$/pc $A_V \gtrsim 7$ + accretion

P. Palmeirim et al. 2012

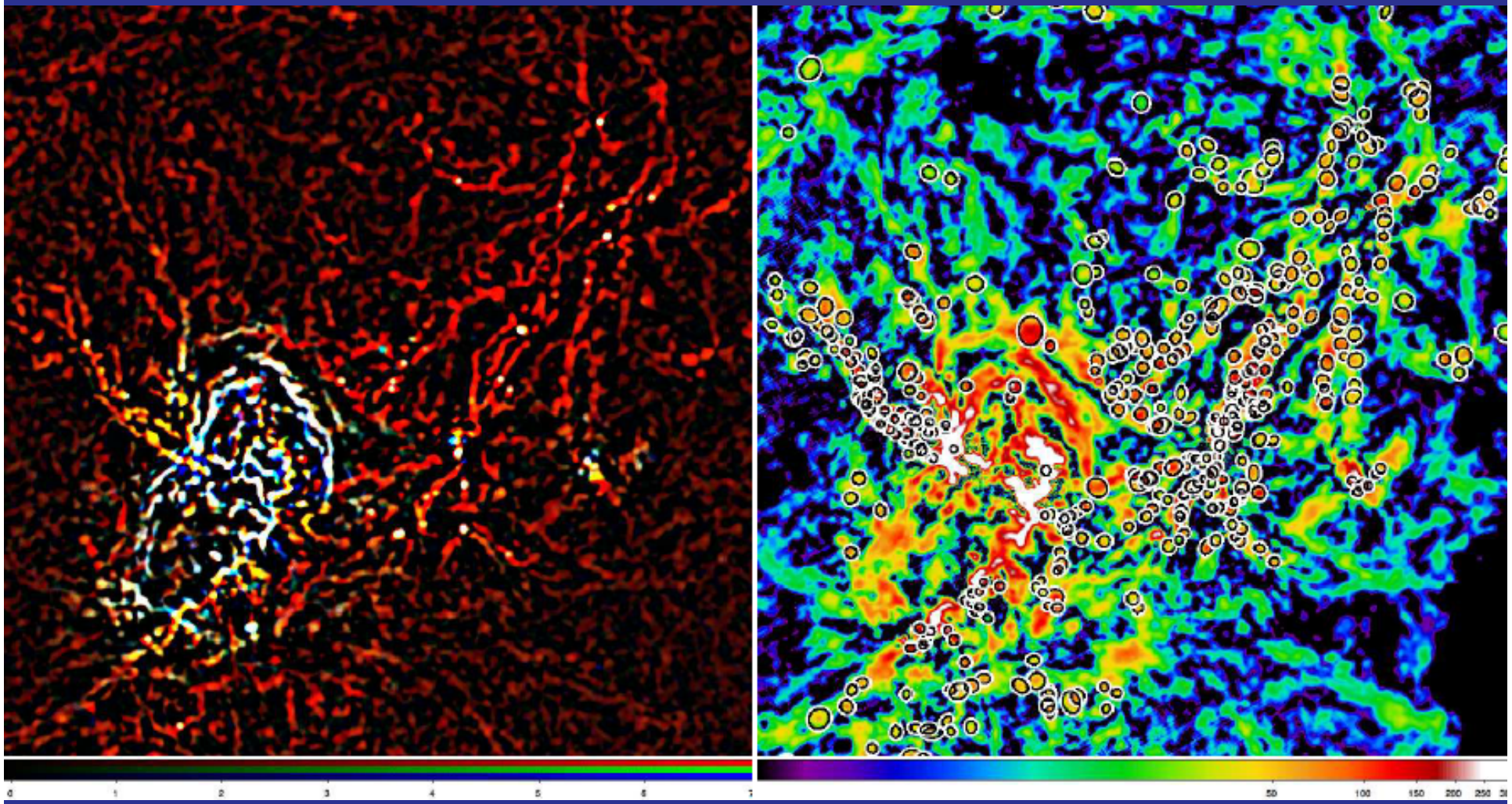
DR21 in Cygnus X: M/L ~ 4000 $M_\odot$/pc

M. Hennemann et al. 2012

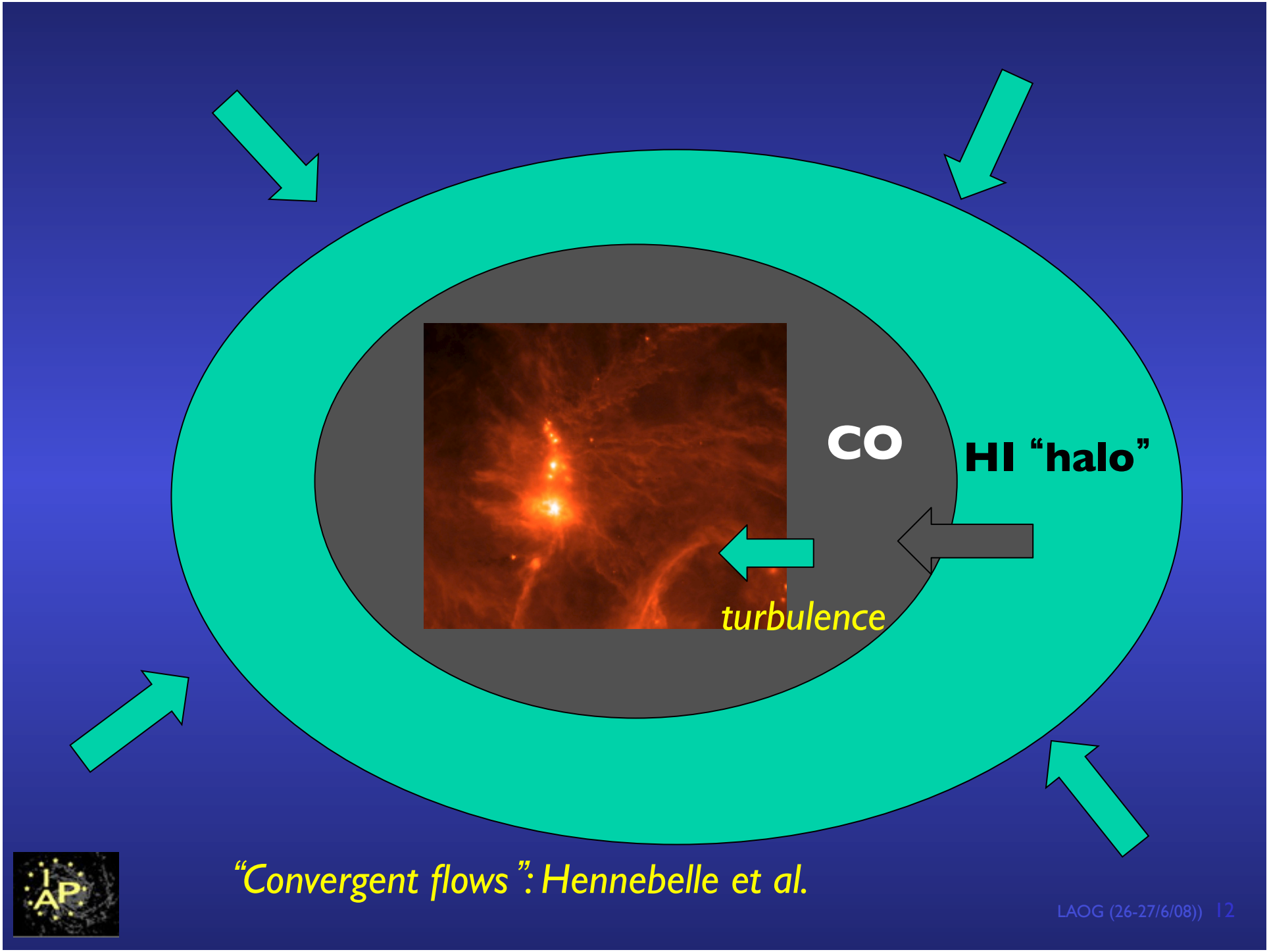


@P. André

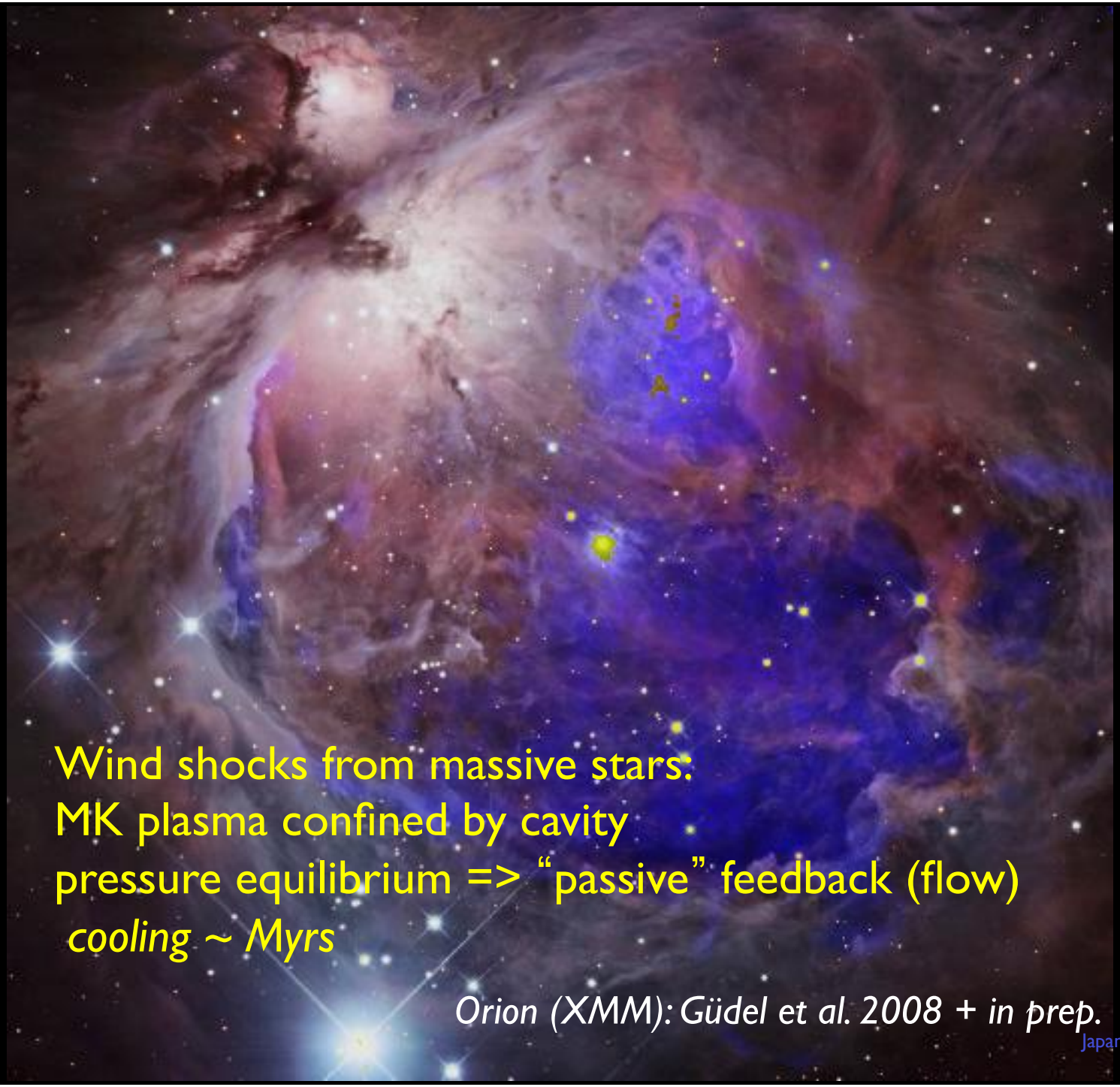
Aquila: from filaments to cores



Mensch'nikov+ 2010

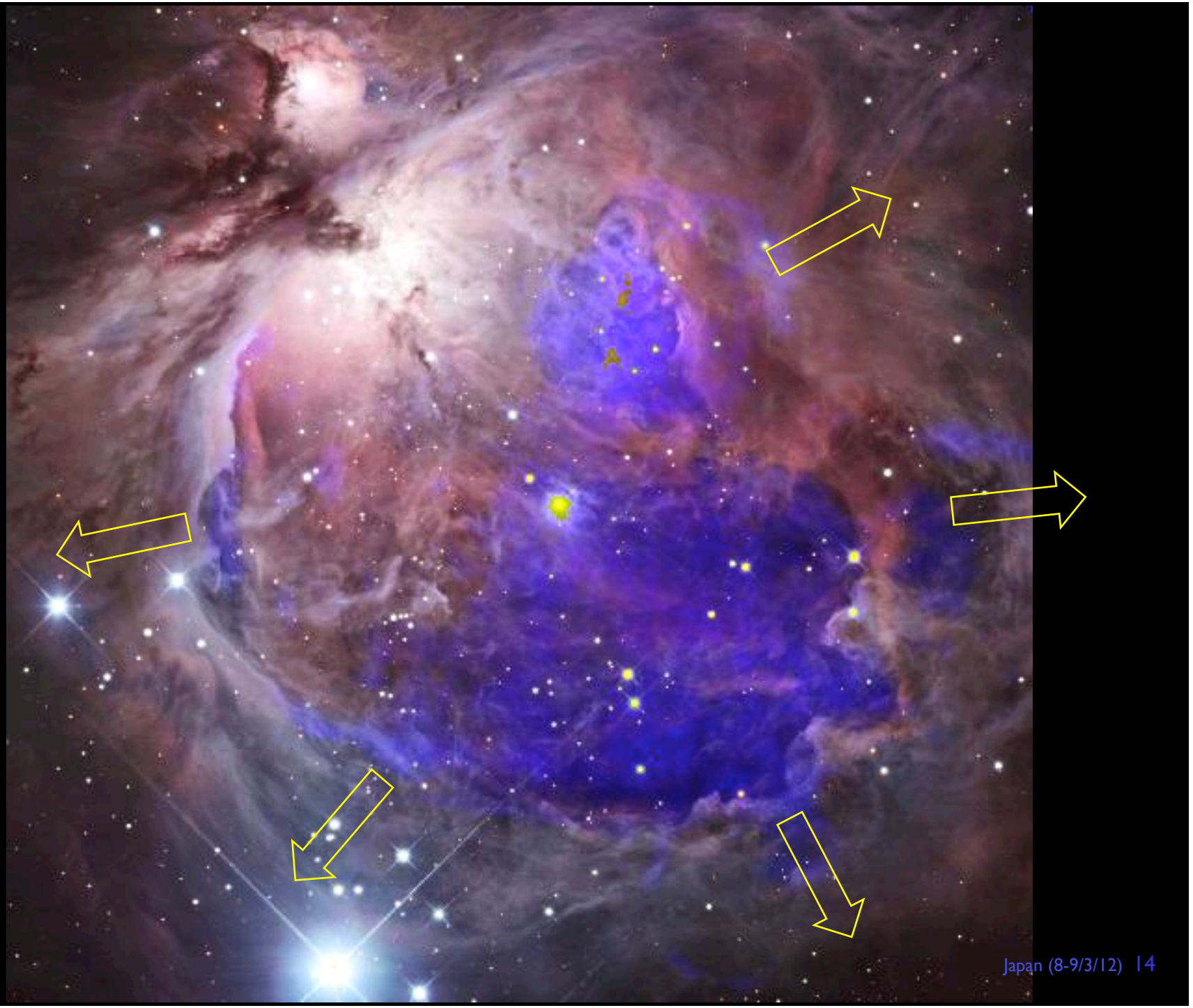


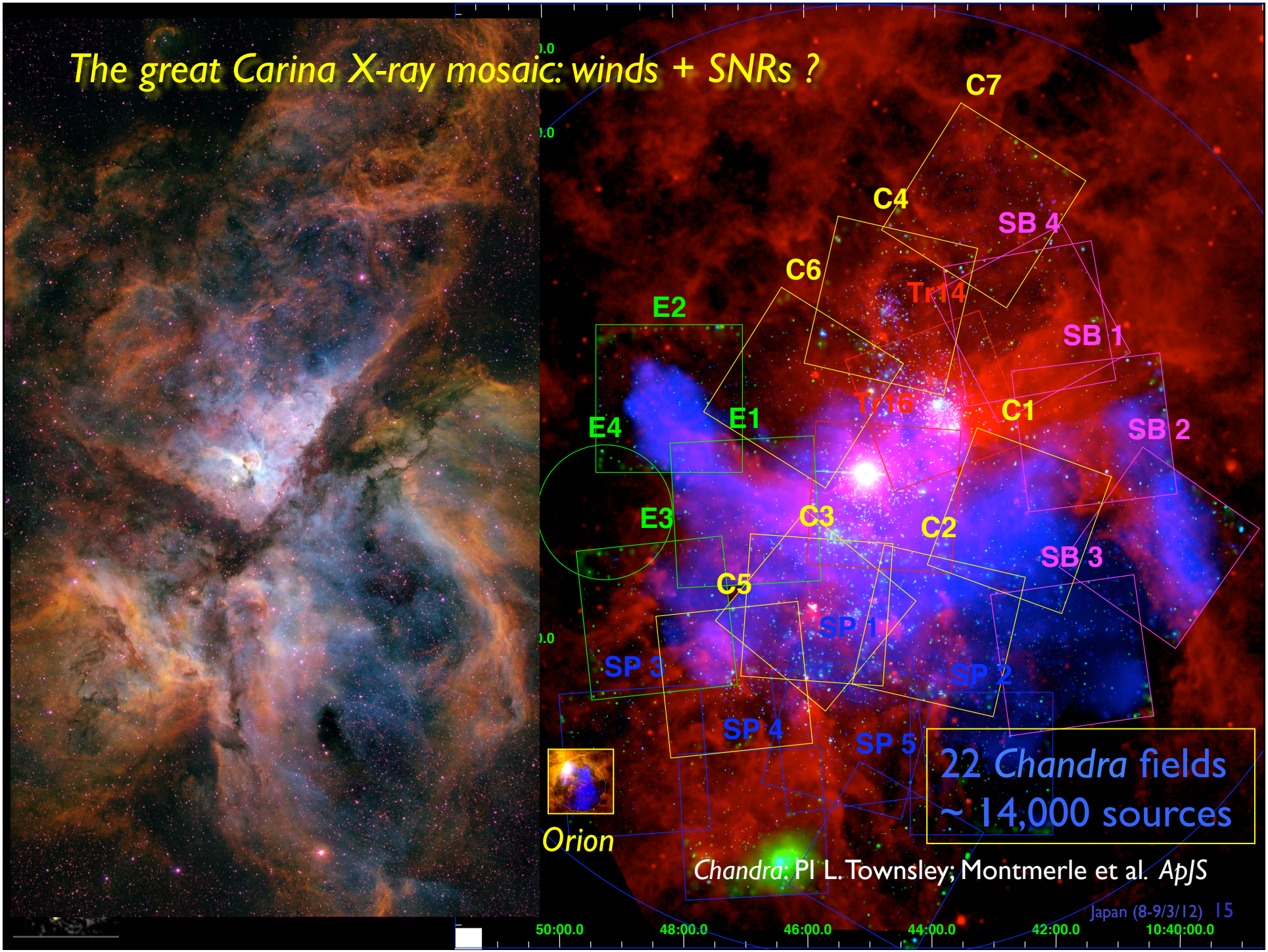
"Convergent flows": Hennebelle et al.

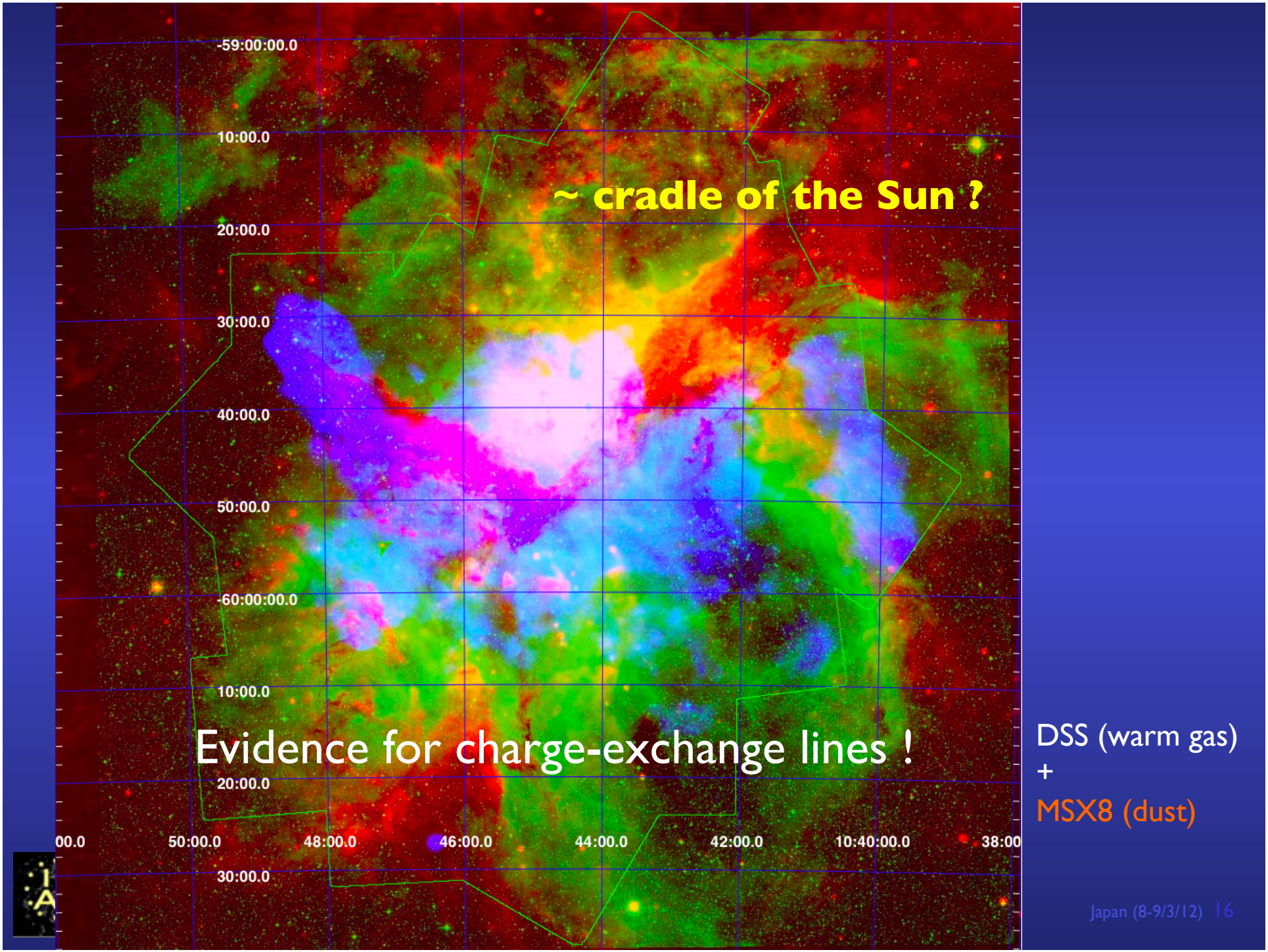


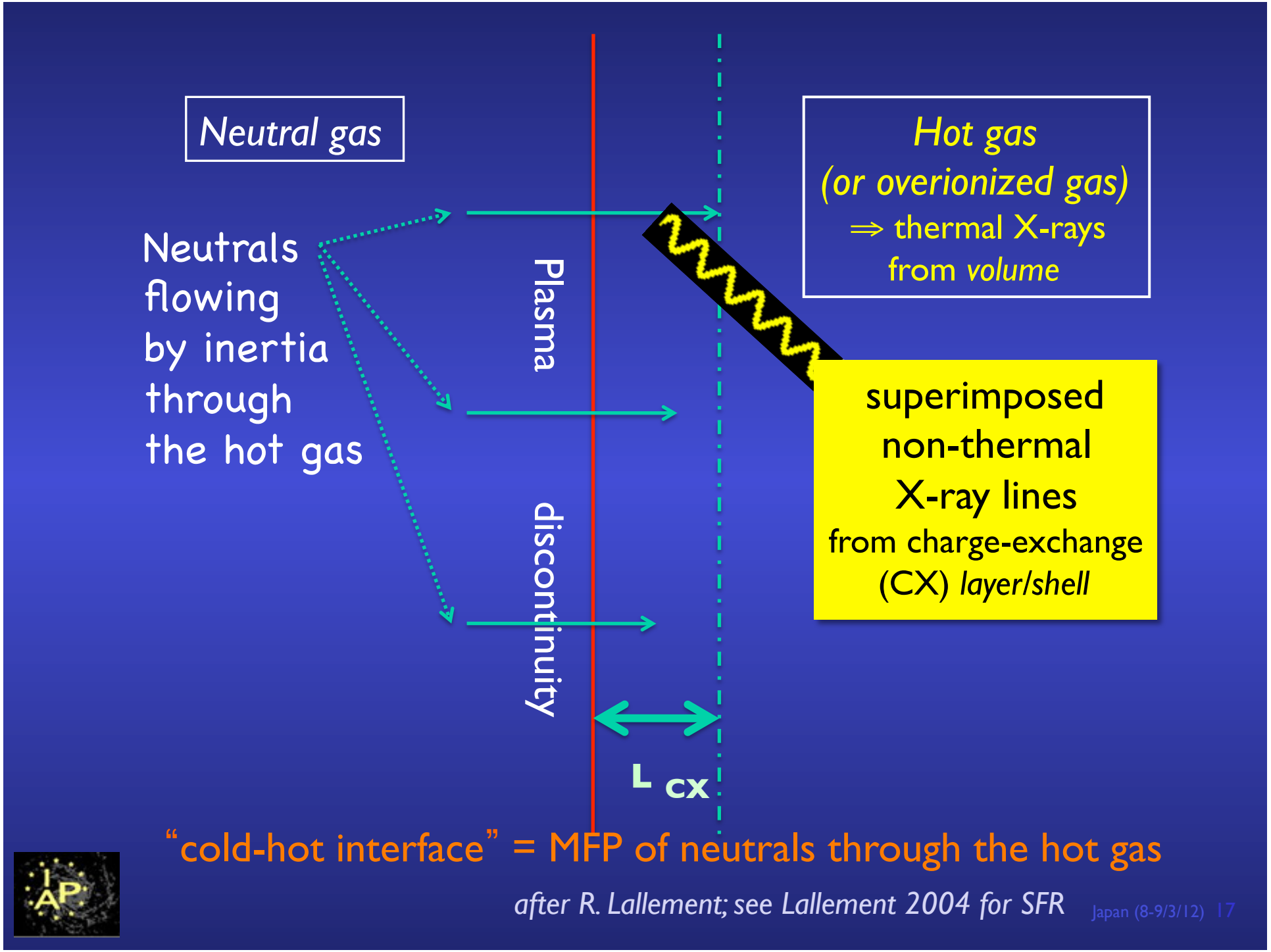
Wind shocks from massive stars:
MK plasma confined by cavity
pressure equilibrium => "passive" feedback (flow)
cooling ~ Myrs

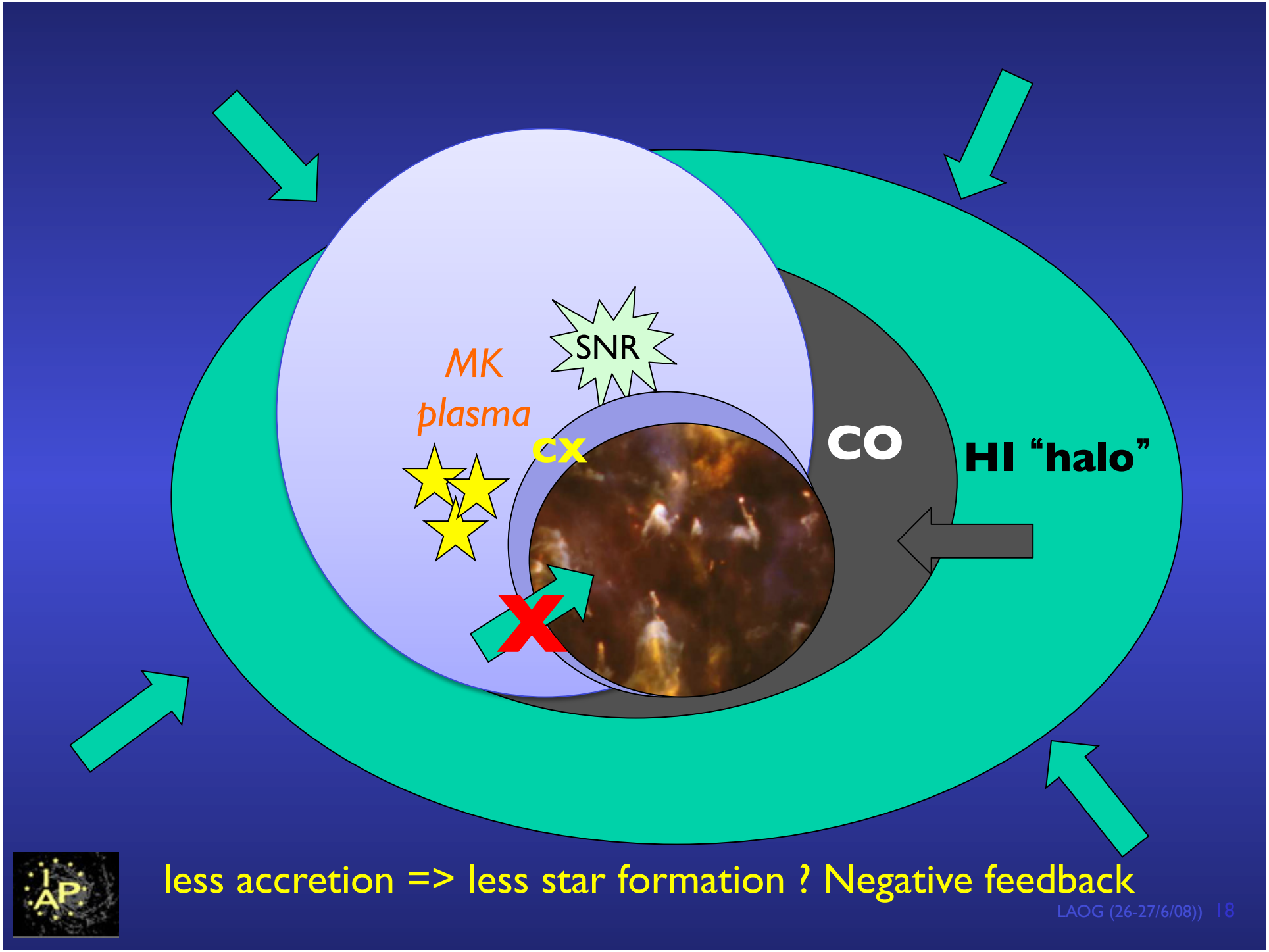
Orion (XMM): Güdel et al. 2008 + in prep.




The great Carina X-ray mosaic: winds + SNRs ?
C7
C4
SB 4
C6
Tr14
E2
SB 1
Tr16
C1
E4
E1
SB 2
E3
C3
C2
SB 3
C5
SP 1
SP 3
SP 2
SP 4
SP 5
Orion
22 Chandra fields
~ 14,000 sources
Chandra: PI L. Townsley; Montmerle et al. ApJS
50:00.0
48:00.0
46:00.0
44:00.0
42:00.0
10:40:00.0


~ cradle of the Sun ?
Evidence for charge-exchange lines !
-59:00:00.0
10:00.0
20:00.0
30:00.0
40:00.0
50:00.0
-60:00:00.0
10:00.0
20:00.0
30:00.0
00.0
50:00.0
48:00.0
46:00.0
44:00.0
42:00.0
10:40:00.0
38:00
DSS (warm gas)
+
MSX8 (dust)

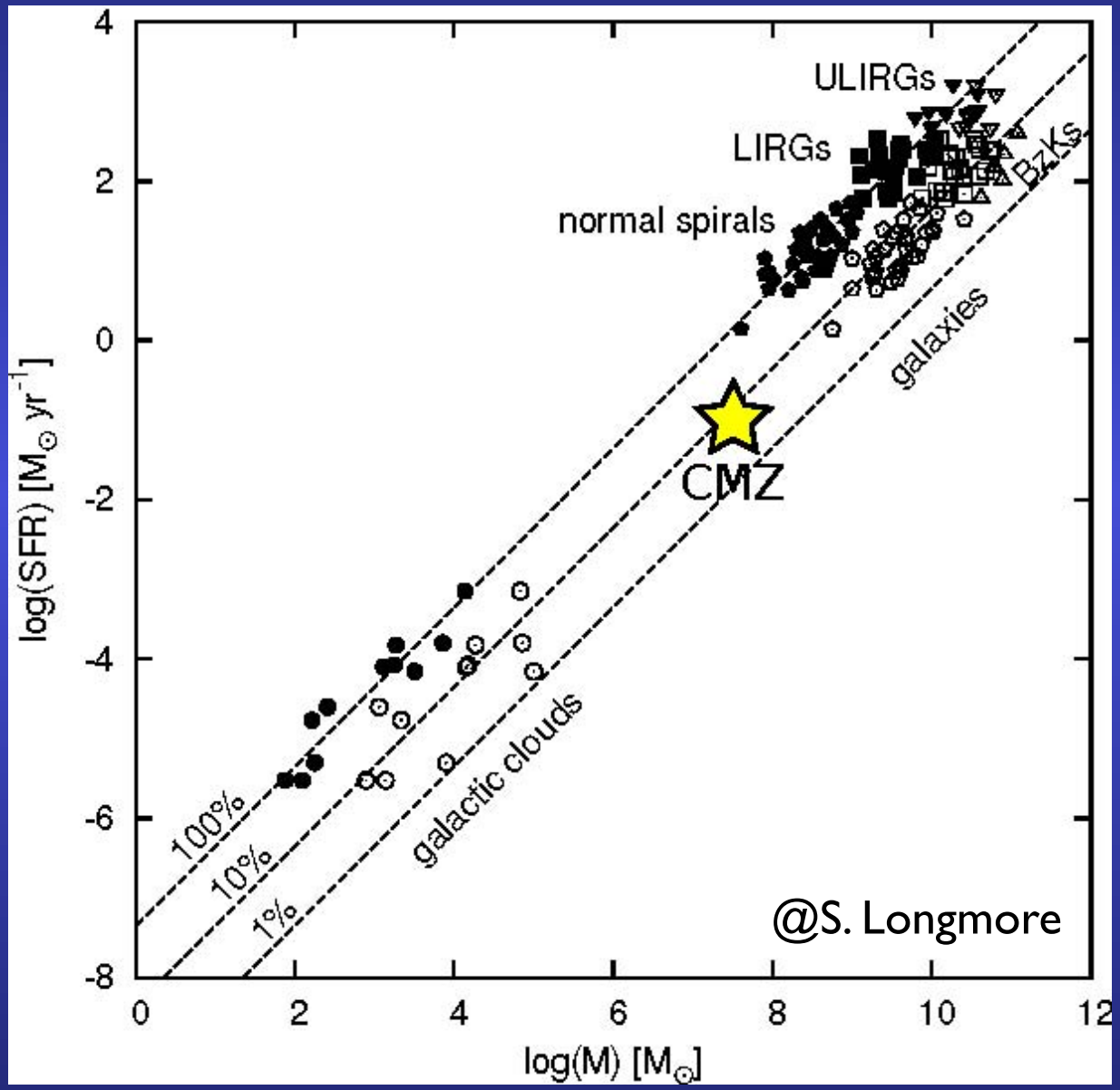

Neutral gas
Hot gas
(or overionized gas)
⇒ thermal X-rays
from volume
Neutrals
flowing
by inertia
through
the hot gas
Plasma
discontinuity
superimposed
non-thermal
X-ray lines
from charge-exchange
(CX) layer/shell
L cx
"cold-hot interface" = MFP of neutrals through the hot gas
after R. Lallement; see Lallement 2004 for SFR



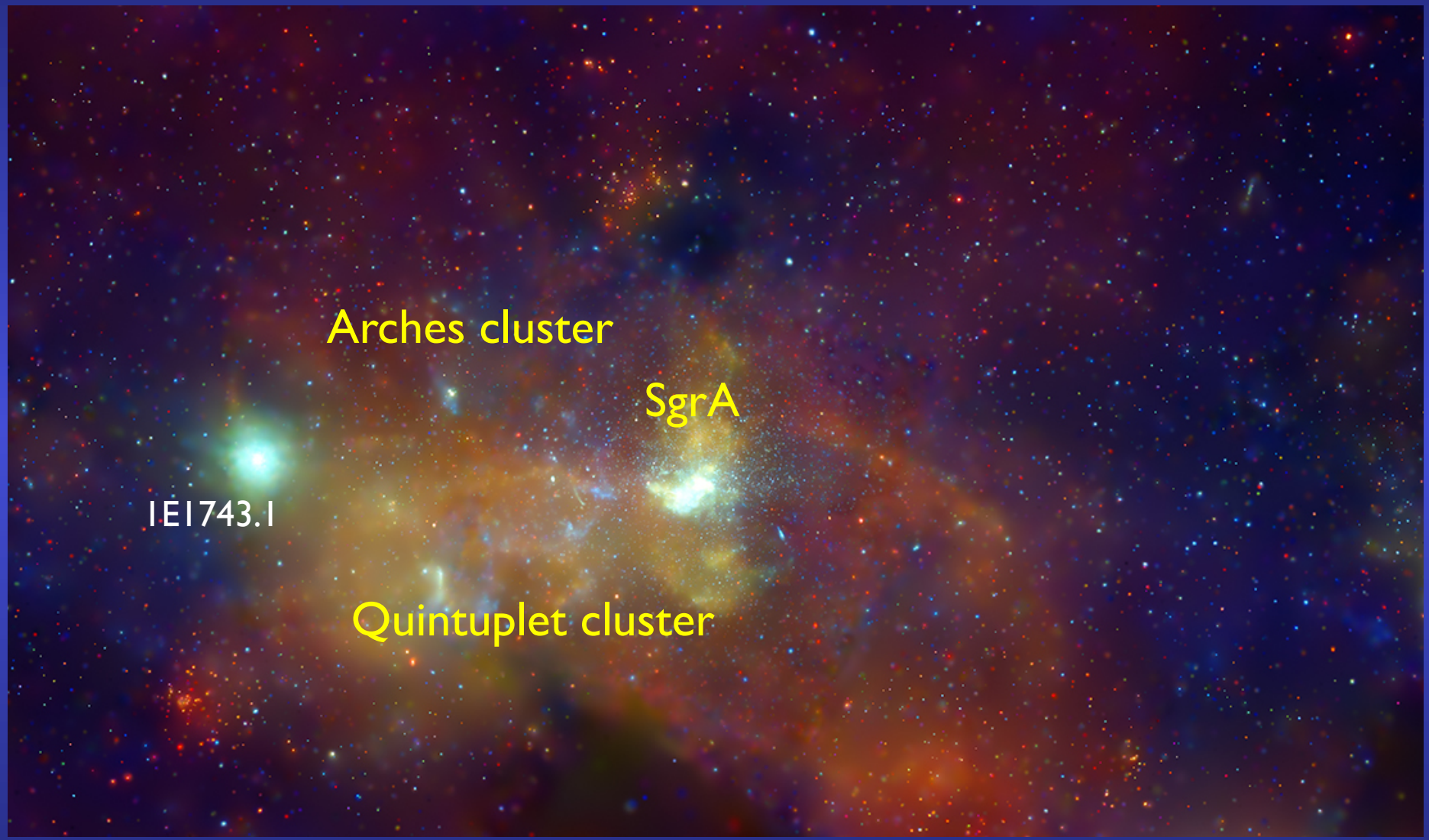
less accretion => less star formation ? Negative feedback


Carina Herschel
70-160-350
Preibisch et al. 2011

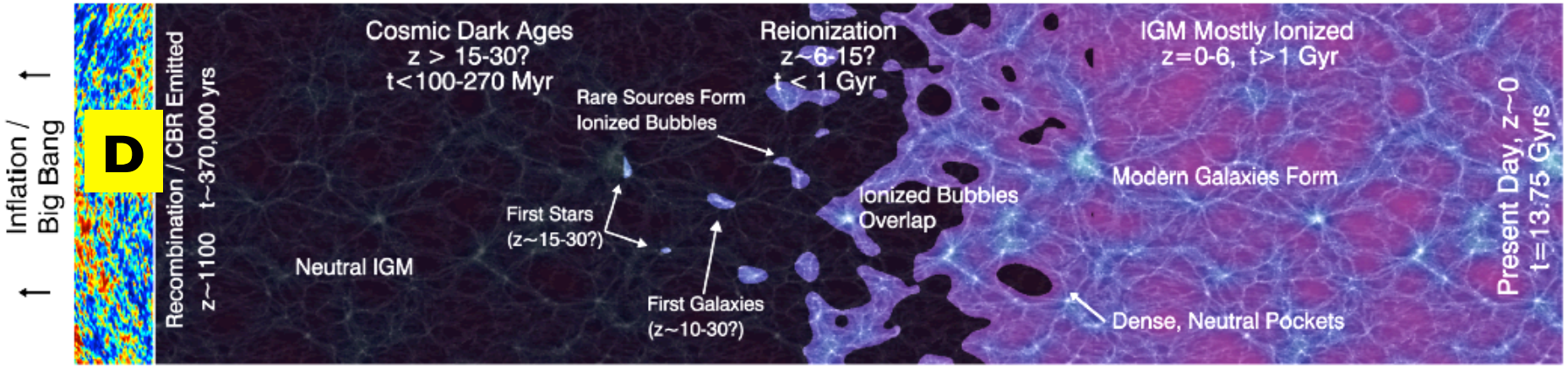
The galactic center



Hot plasma in the galactic center region



=> low SFE = inefficient accretion ?

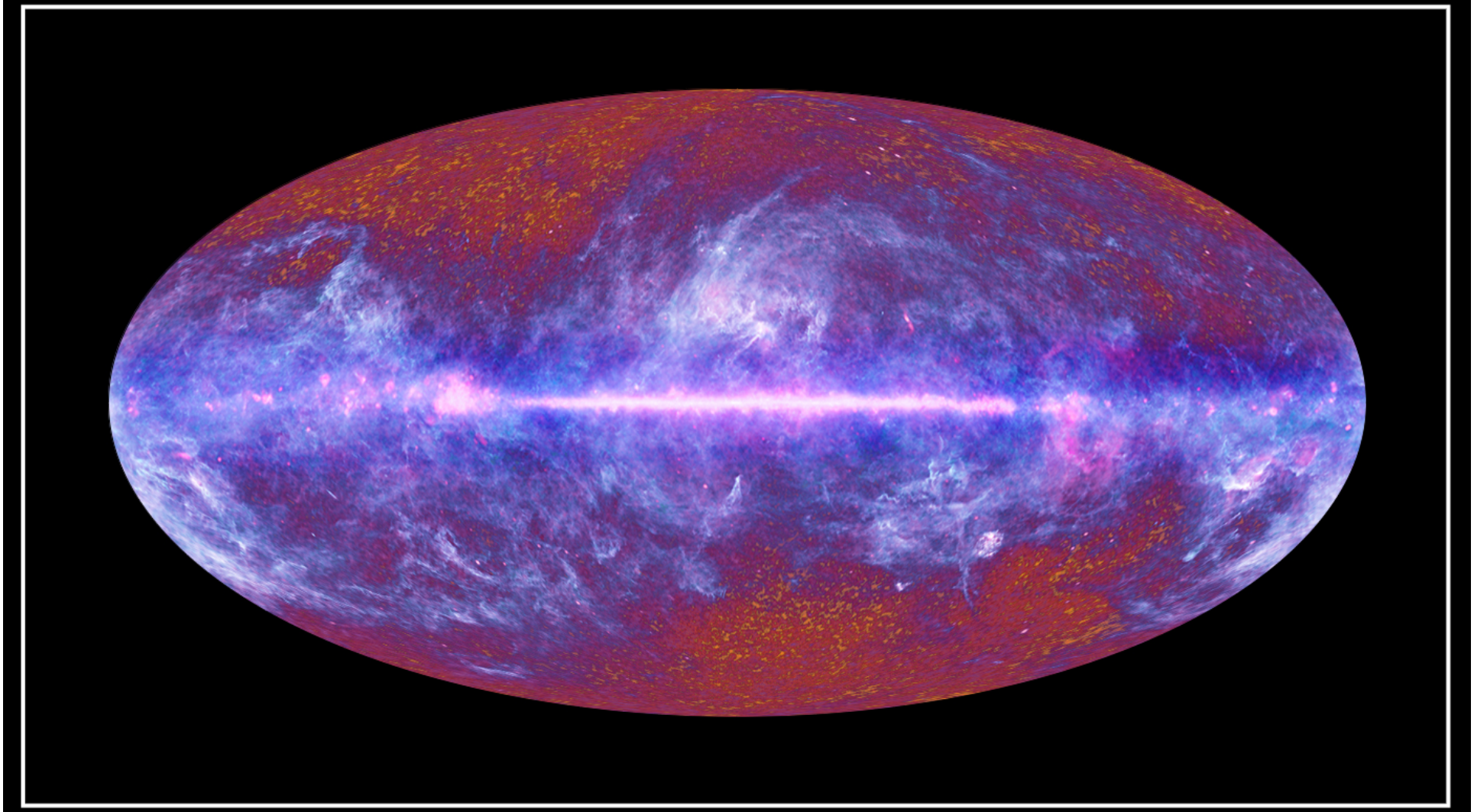


Robertson+ 2010

Cosmic web = filaments

(+ dark matter)

characterization methods succesfully used in molecular cloud filaments !



The Planck one-year all-sky survey

esa