Hugo Messias, LWSF, Manchester, 2017 July 25th

H1429-0028

A case for a wet-dry merger with a kpc outflow / chock at z~1

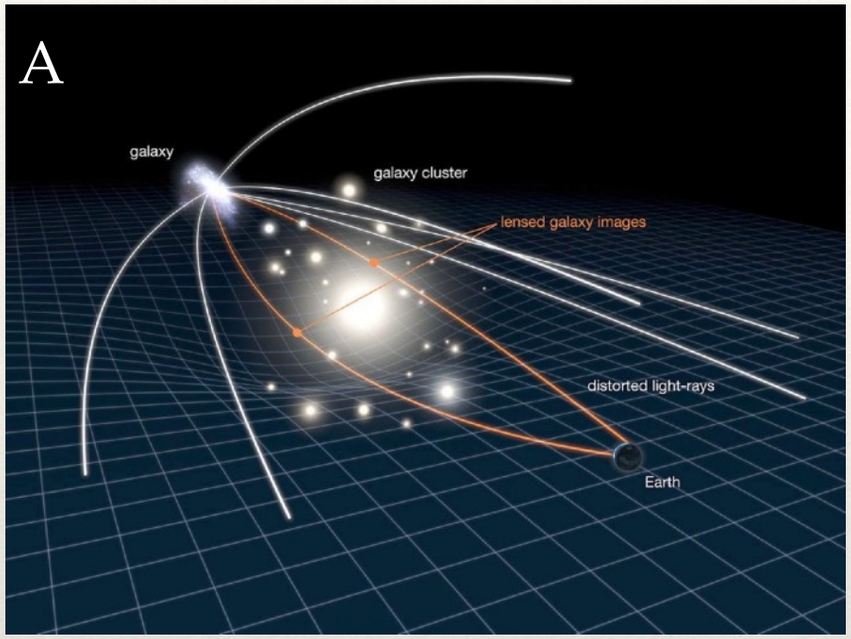
SF via SED, Ha, IR, and radio

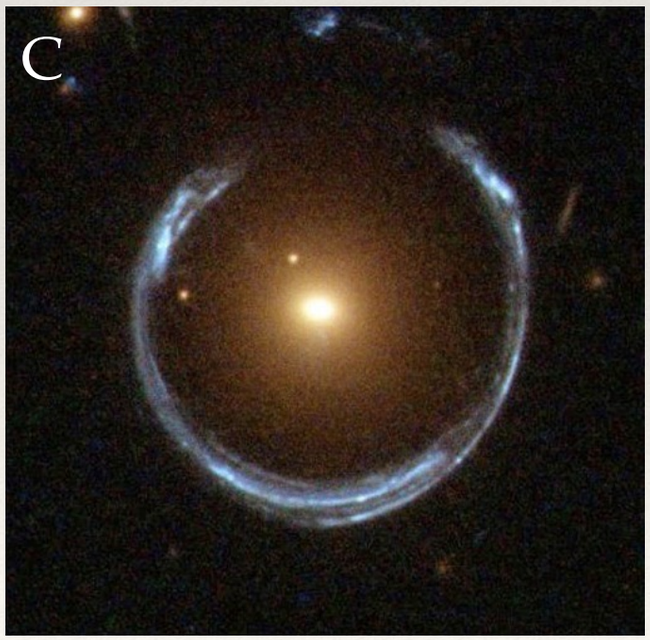
ALMA

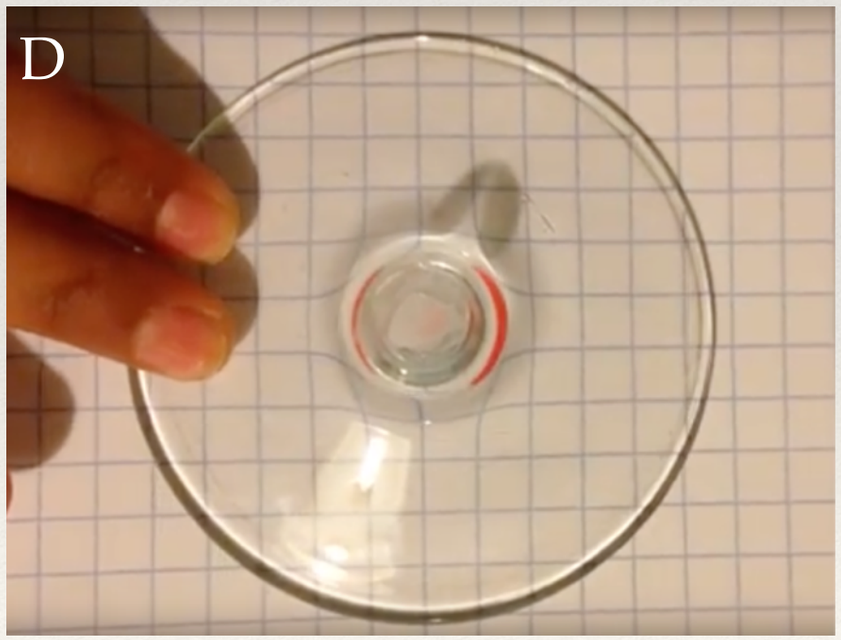
ia instituto de astrofísica e ciências do espaço

ATLAS

Gravitational lensing

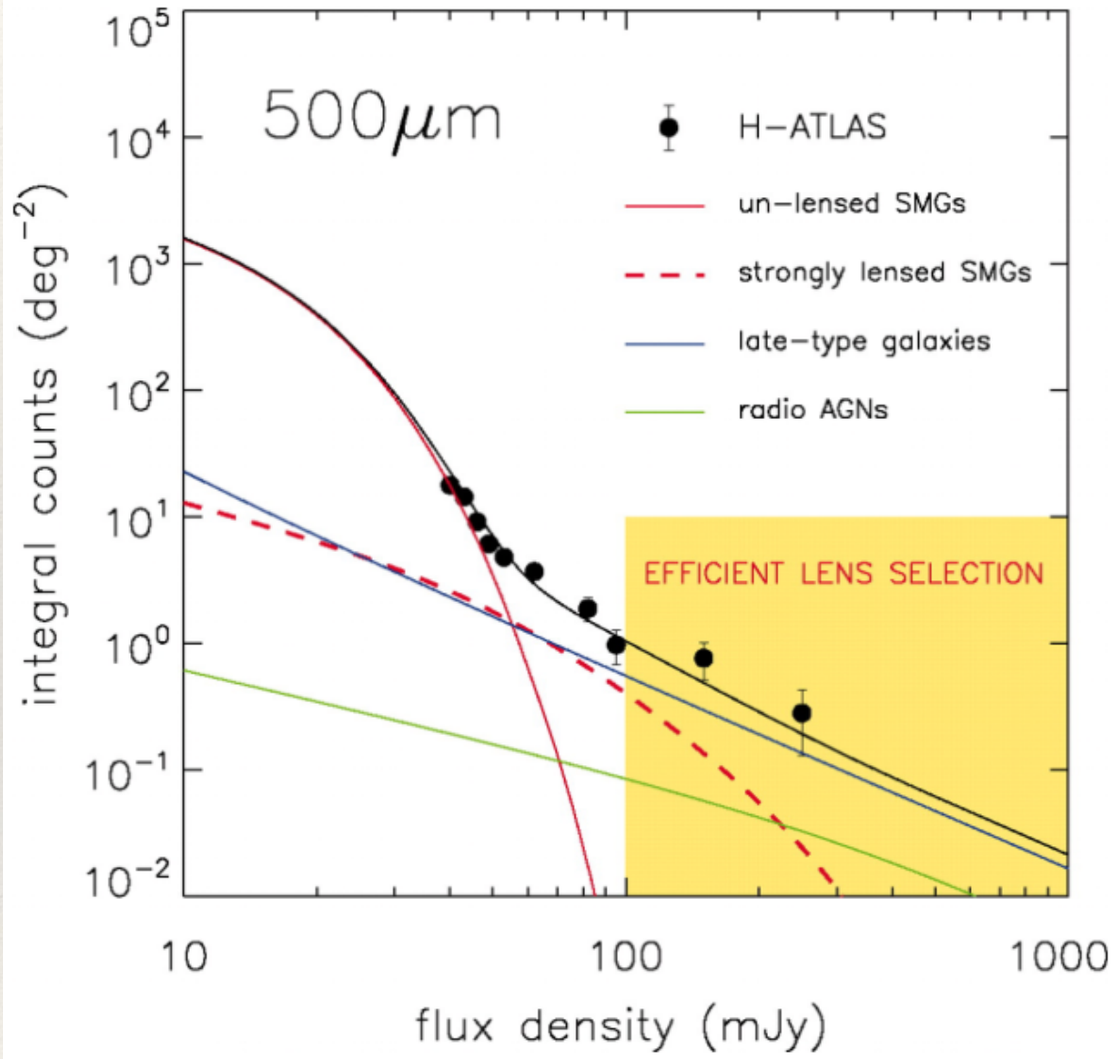






Credits:
A/B/C – HST/NASA/ESA
D/E – https://youtu.be/e5jr1DWe59s

GL @ long-wavelengths



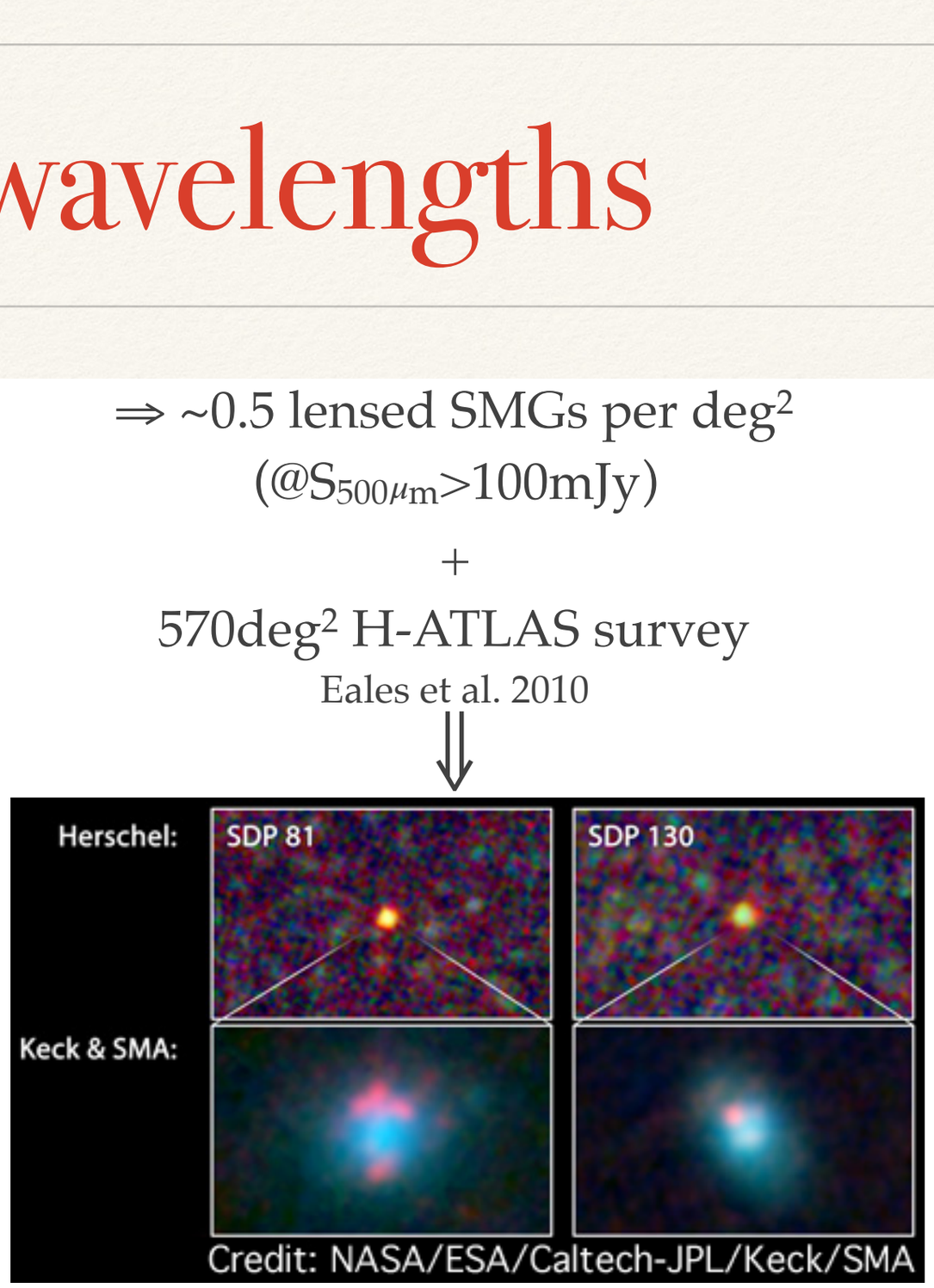
Negrello et al. (2010)

⇒ ~0.5 lensed SMGs per deg^2
(@$S_{500\mu m}$>100mJy)

+

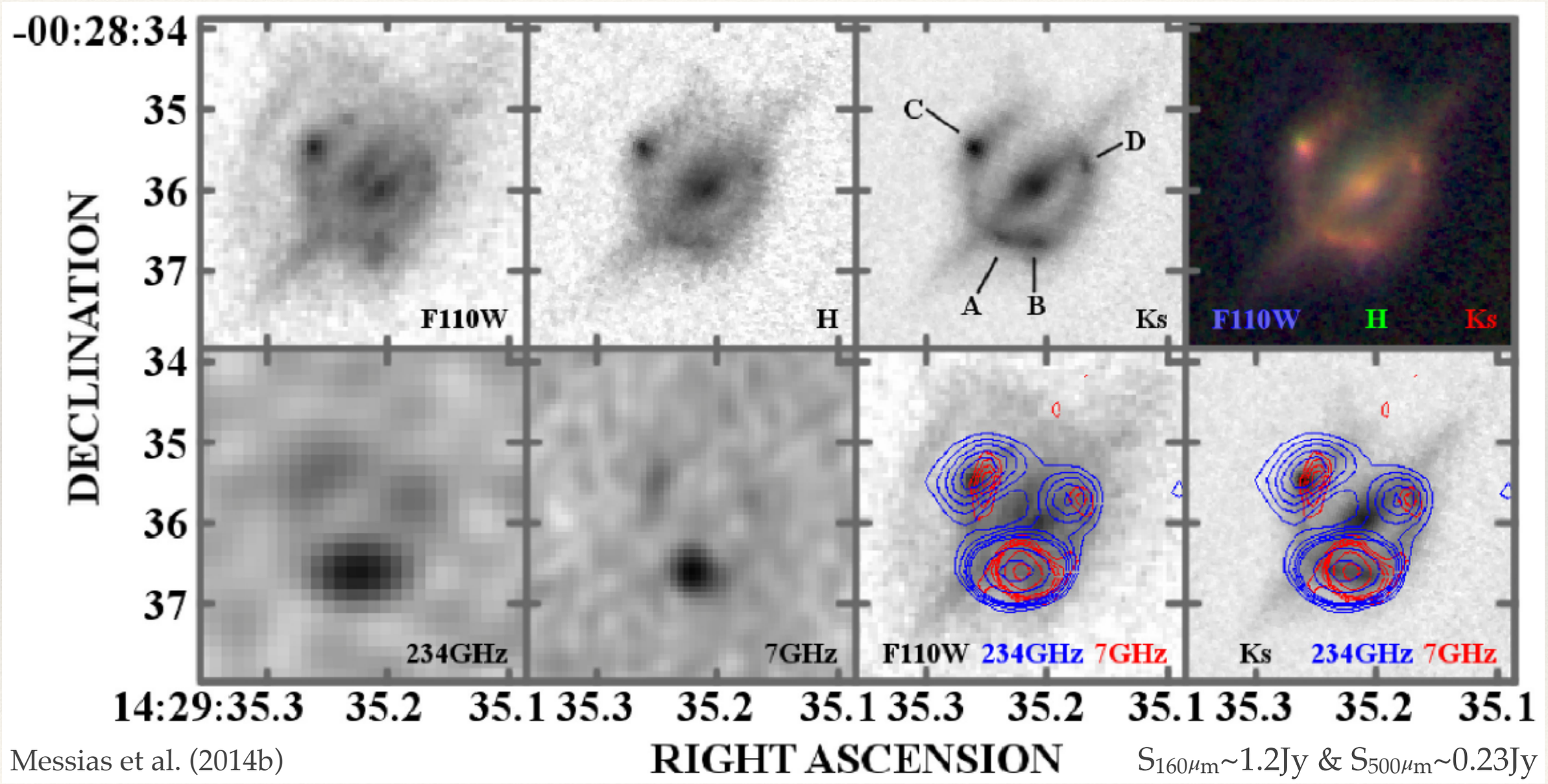
570deg^2 H-ATLAS survey

Eales et al. 2010



H142935.3-002836

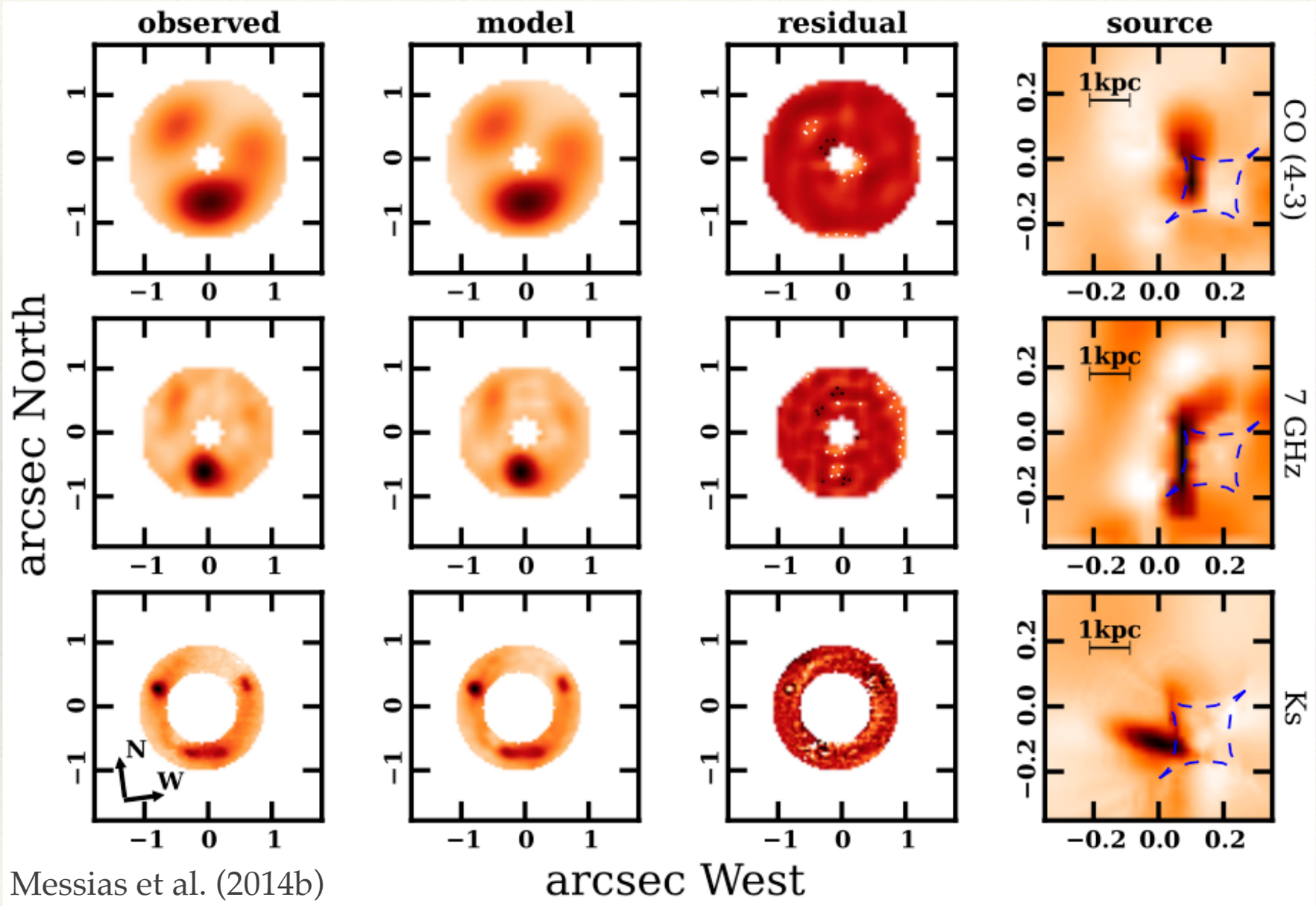
H1429-0028



Messias et al. (2014b)

$S_{160\mu m}$~1.2Jy & $S_{500\mu m}$~0.23Jy

Source-plane reconstruction



Messias et al. (2014b)

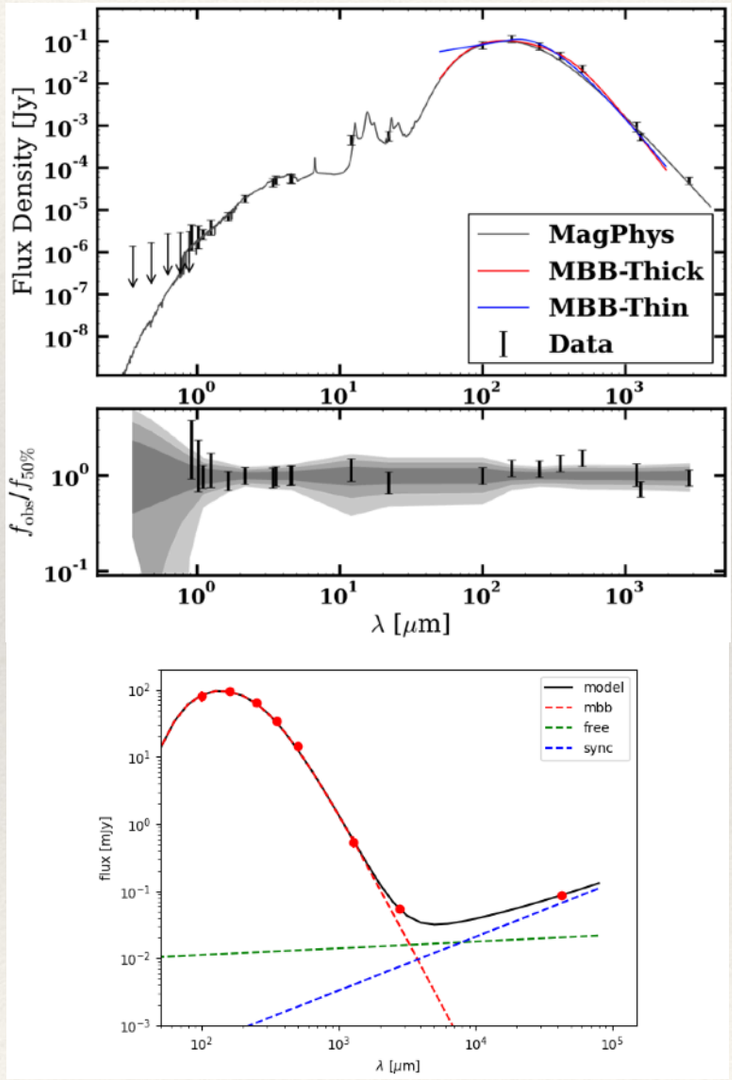
Fact sheet

- z_{lens}=0.218 & z_{H1429}=1.027
- M(<$\boldsymbol{\theta}_E$)~8E10 $M_\odot$ (~20% stellar) ⇒ μ=8–10
- ~1:3 merger (dynamical and SED analysis)
- M*~1.3E11 $M_\odot$; SFR~60–400 $M_\odot$/yr; M_{ISM}~5E10 $M_\odot$
- 12+log(O/H)~8.5 (solar~8.7)

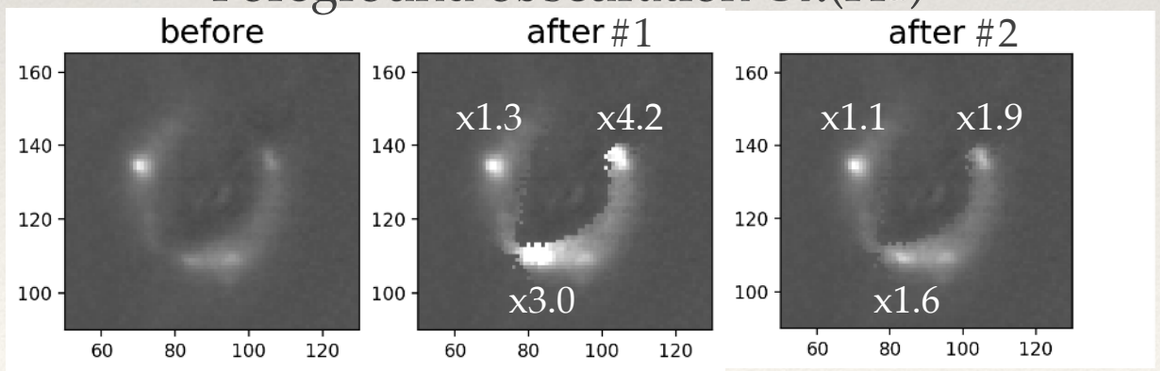
Messias et al. (2014b) & Timmons et al. (2015)

Multi-wavelength SFRs

- SED (UV-to-mm) => 394±90 $M_\odot/yr$ [MagPhys, daCunha+08]
- Hα – 60±50 (foreg. obsc. ⇒ upLim)
- IR => 390 ($^{+810}$,$_{-200}$) $M_\odot/yr$ [Bell03]
- $radio^{NT}$ => 238($^{+240}$,$_{-123}$) $M_\odot/yr$ [Bell03]
  $radio^{T}$ => ~360 $M_\odot/yr$ [Murphy+11]



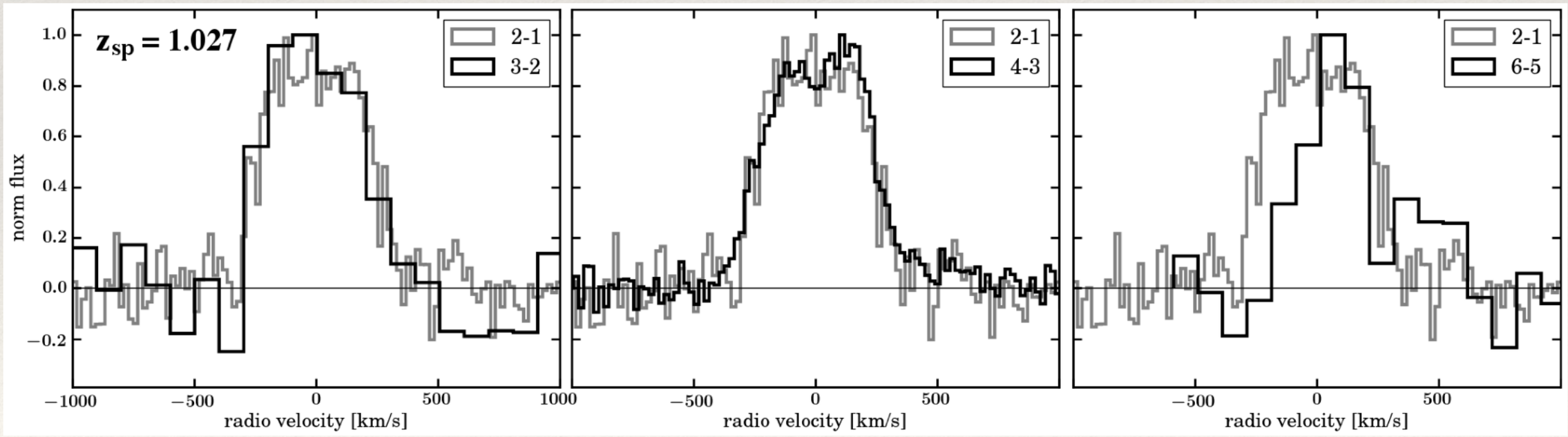
Foreground obscuration @λ(Hα)



CO rotation-line profile

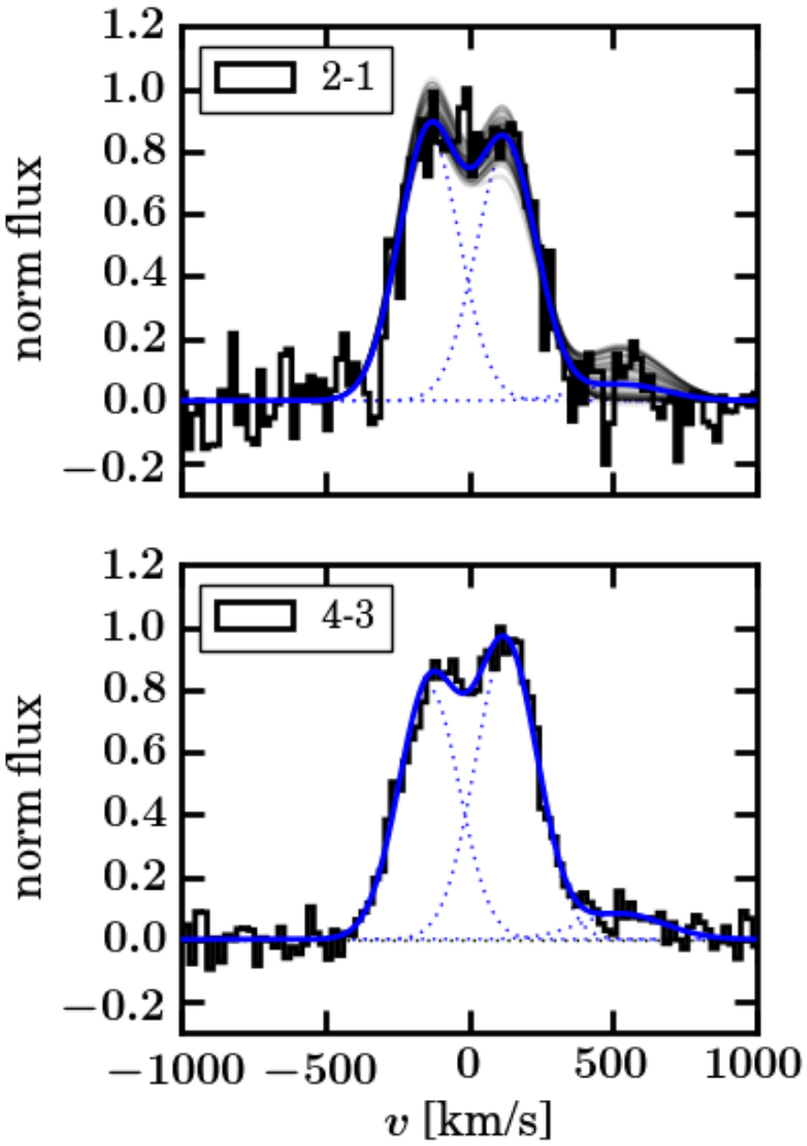
Three components?

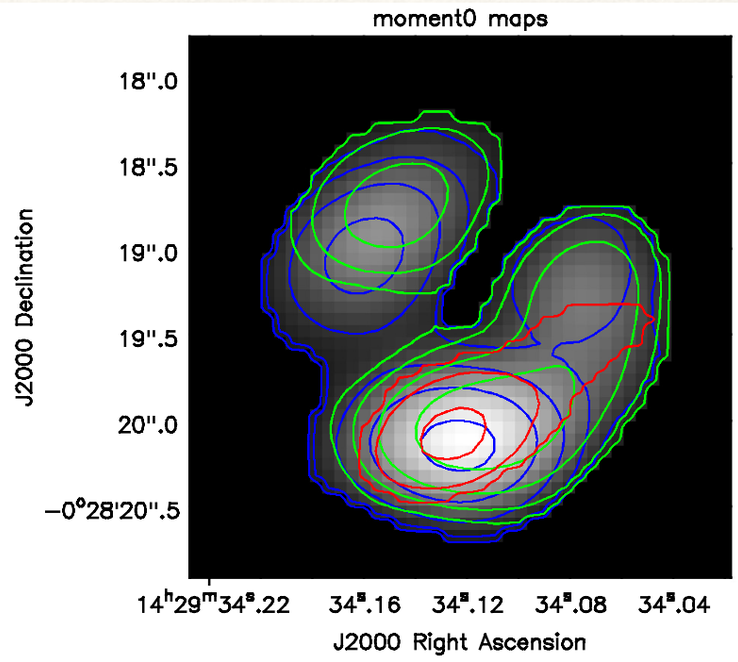
- ALMA(B3+6)@Cycle0 – CO (2-1) and (4-3)
- APEX(SEPIA5+APEX1)@P97 – CO (3-2) and (6-5)
- outflow, chock-region, *Voorwerp*-object?



CO line decomposition

Three components



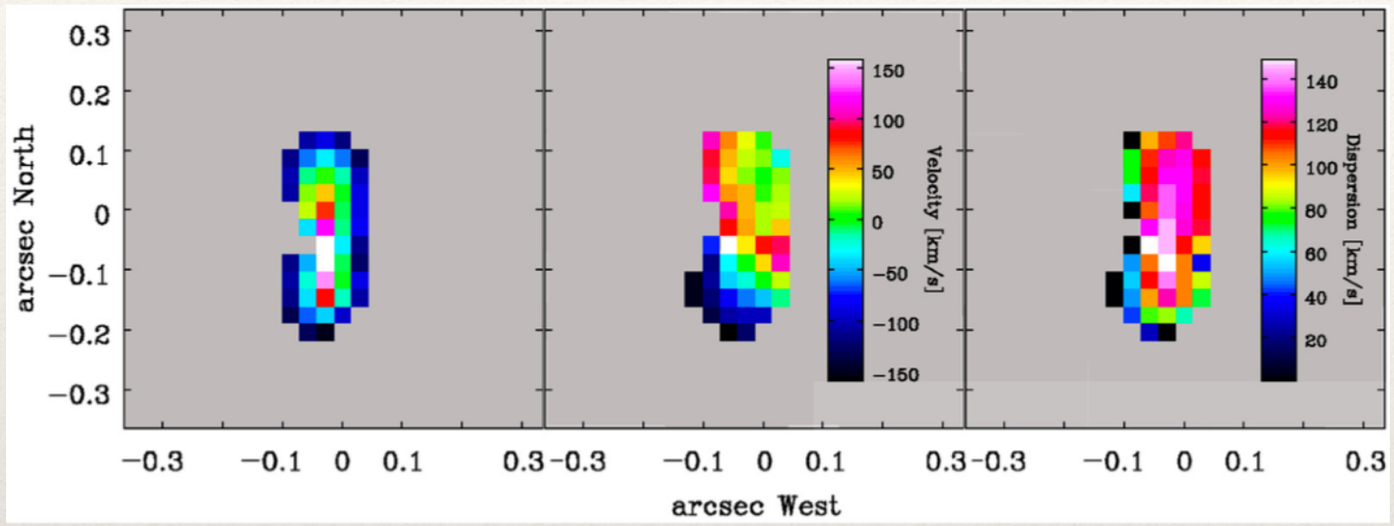


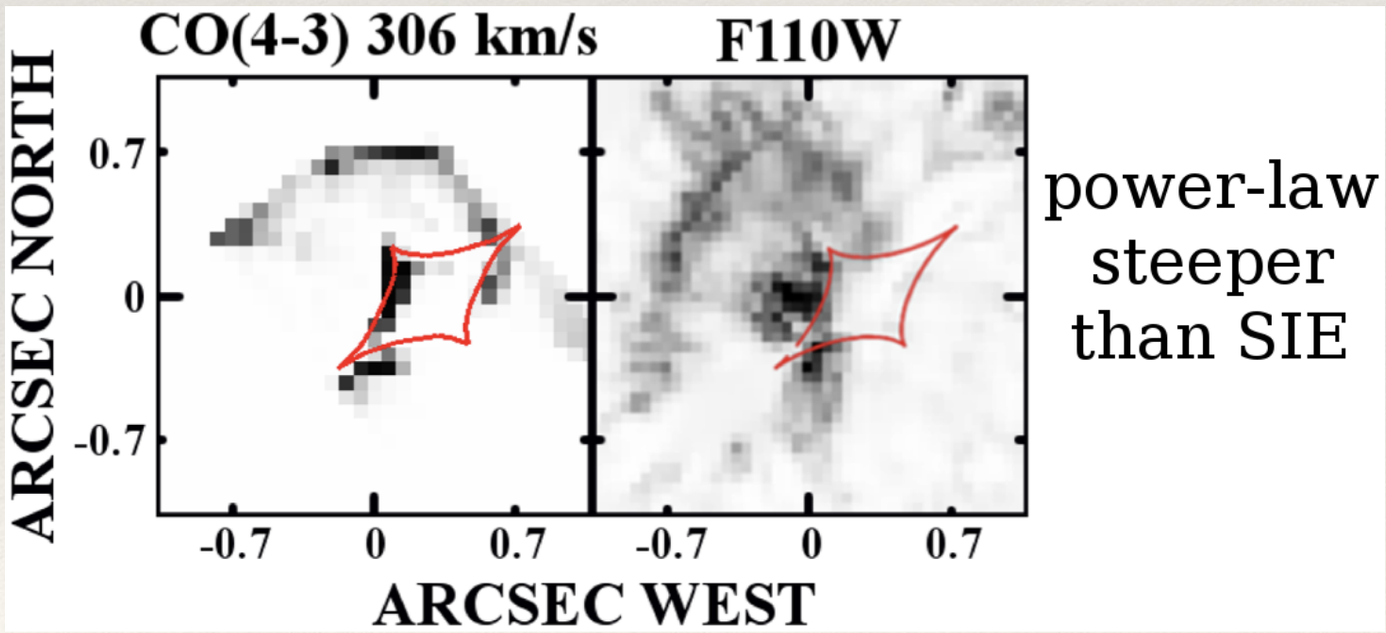
v = 505±20 km/s

FWHM = 522±40 km/s

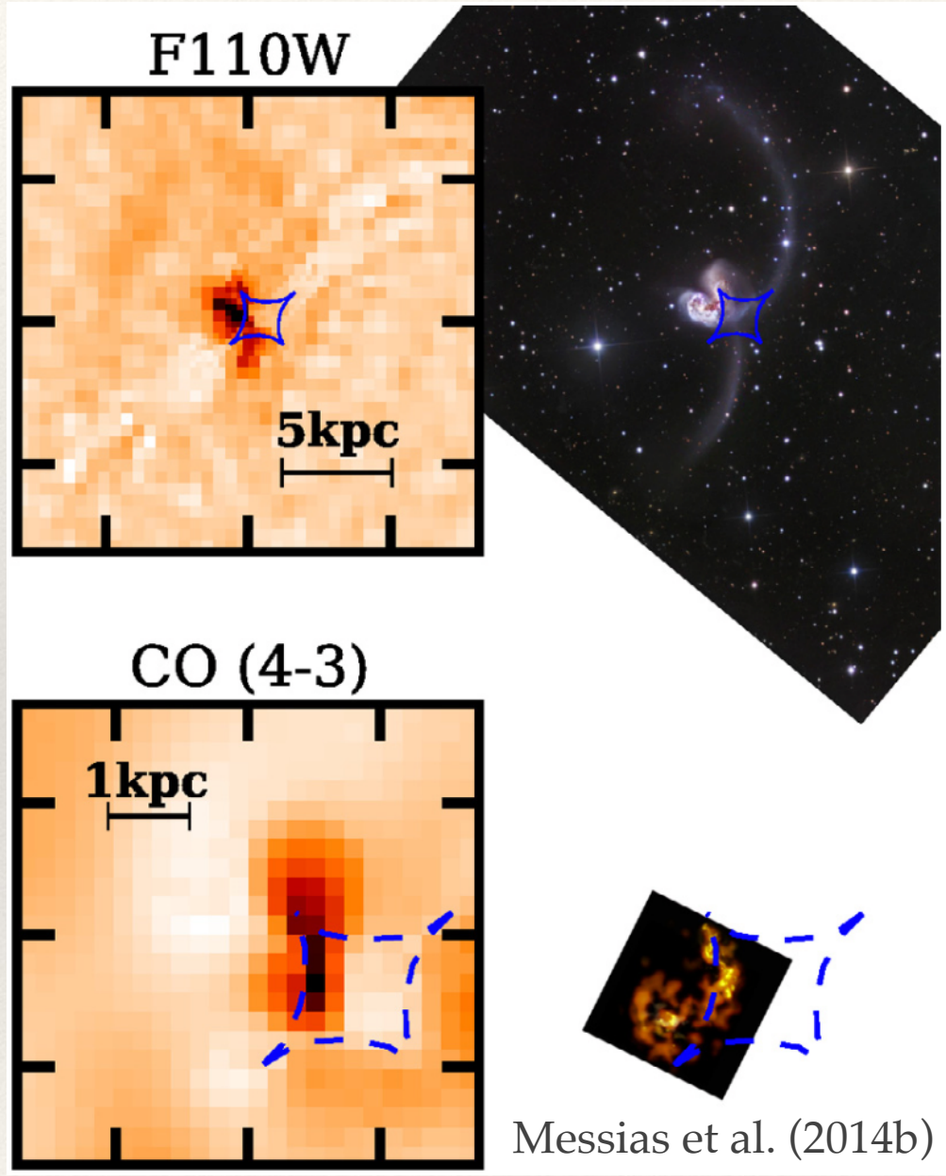
Tidal, outflow, chock, Voorwerp?

Source-plane reconstruction





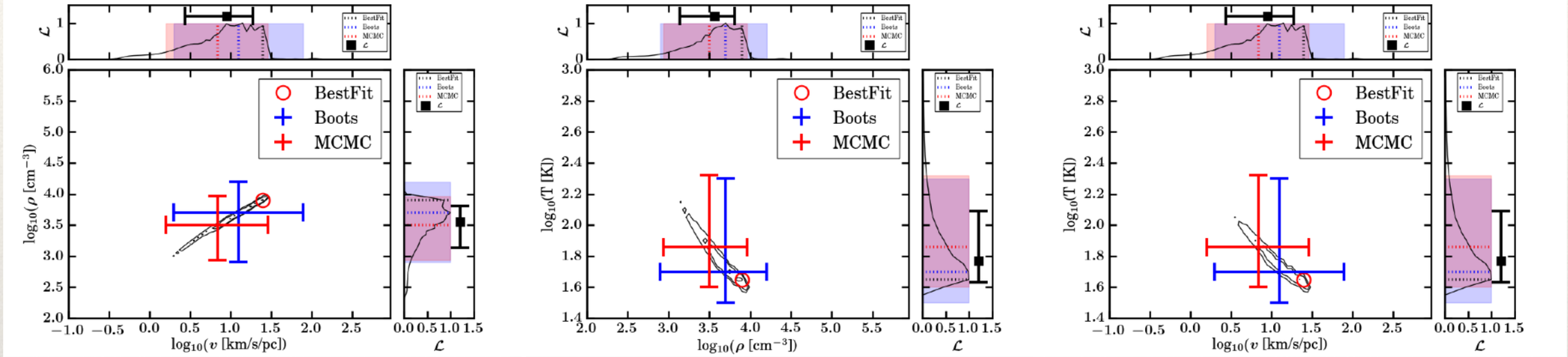
power-law steeper than SIE

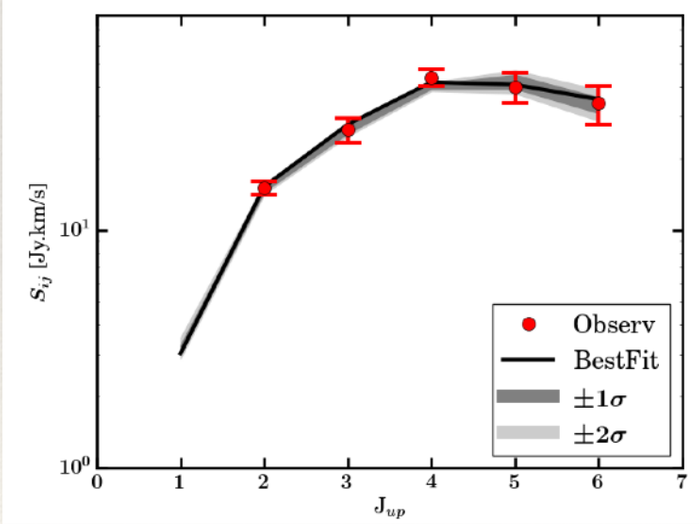


Messias et al. (2014b)

Molecular gas

Current follow-up work





myRadex

LVG (expanding shell):

$\log(M_{H2}[M_\odot])=10.22\pm0.07$

T ~ 60K

$\log(\boldsymbol{\rho}[\mathrm{cm}^{-3}]) \sim 3.6$

$\boldsymbol{\alpha}_{CO} \sim 0.9$

$f(M_{H2}/M_{ISM}) = 36\pm15\%$

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- ~1:3 merger (dynamical and SED analysis)
- M^*~1.3E11 $M_\odot$; SFR~400 $M_\odot$/yr; M_{ISM}~5E10 $M_\odot$
- M_{H2} ~1E10.2 $M_\odot$ ~ 36% M_{ISM} ⇒ $\boldsymbol{\tau}$~40 Myr
- 12+log(O/H)~8.5 (solar~8.7)

Messias et al. (2014b, in prep.) & Timmons et al. (2015)

Thank you!

Questions?