

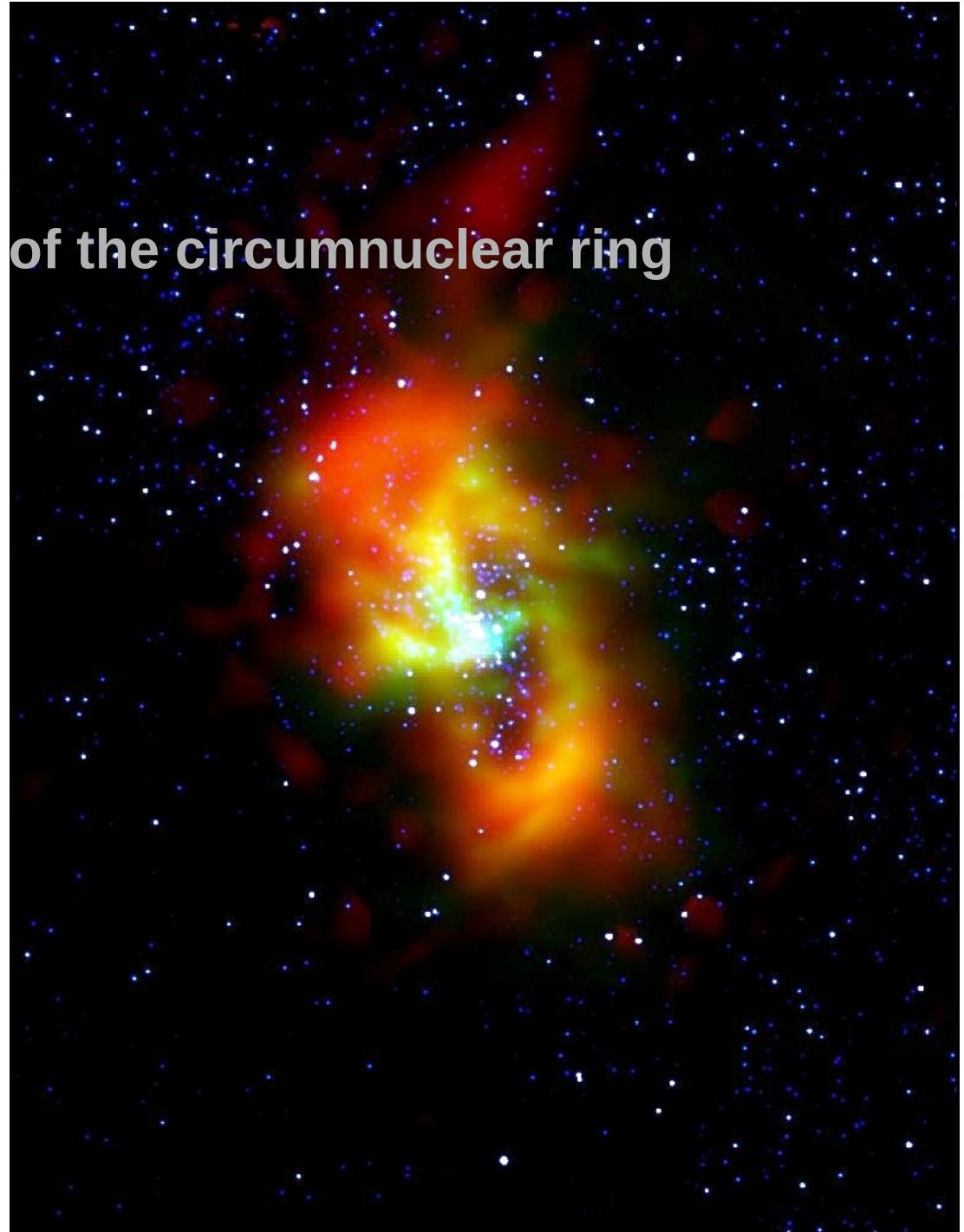
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The dense phase of the circumnuclear ring

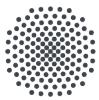
Iserlohe et al., 2019, ApJ, 885, 1691

C. Iserlohe, A. Bryant, A. Krabbe,
S. Beckmann, S. Colditz, C. Fischer,
F. Fumi, N. Geis, T. K. Henning,
R. Höhle, R. Klein, L. W. Looney,
A. Poglitsch, W. Raab, F. Rebell, and
W. D. Vacca



18.9.2019, AG-Tagung Stuttgart

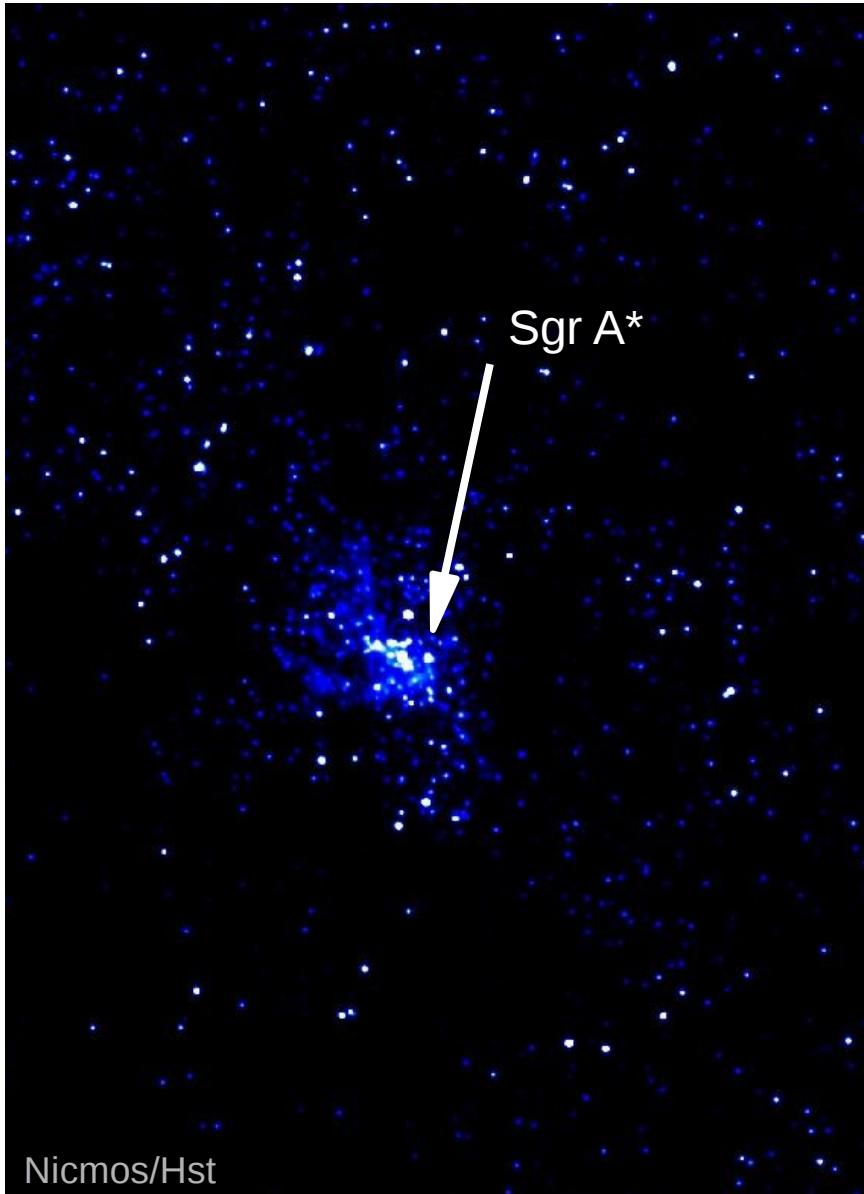
Christof Iserlohe, DSI



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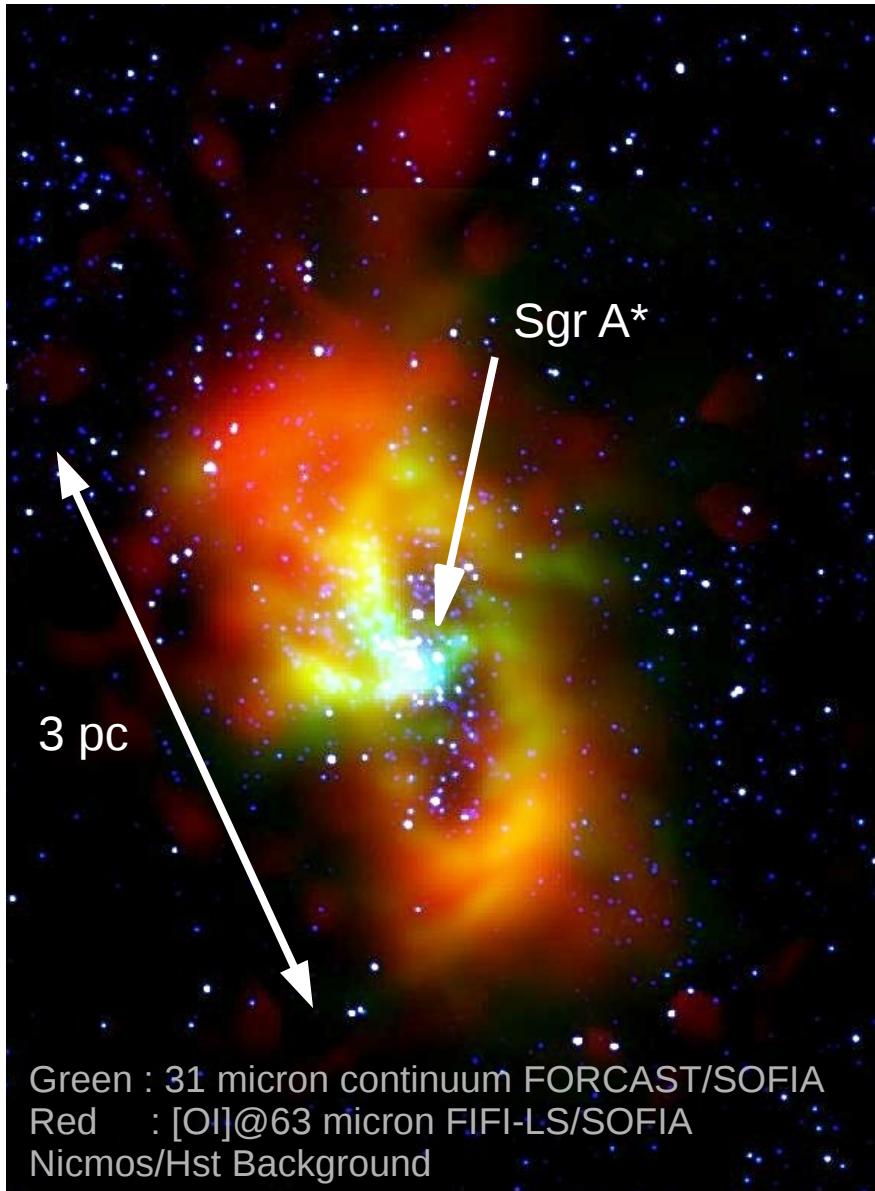
Intro



The center of the milkyway:
SMBH Sgr A* with 4×10^6 solar masses



Intro



The center of the milkyway:
SMBH Sgr A* with 4×10^6 solar masses

Circumnuclear Ring (CNR) :

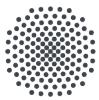
System of gas streamers around Sgr A*

~3 pc in diameter

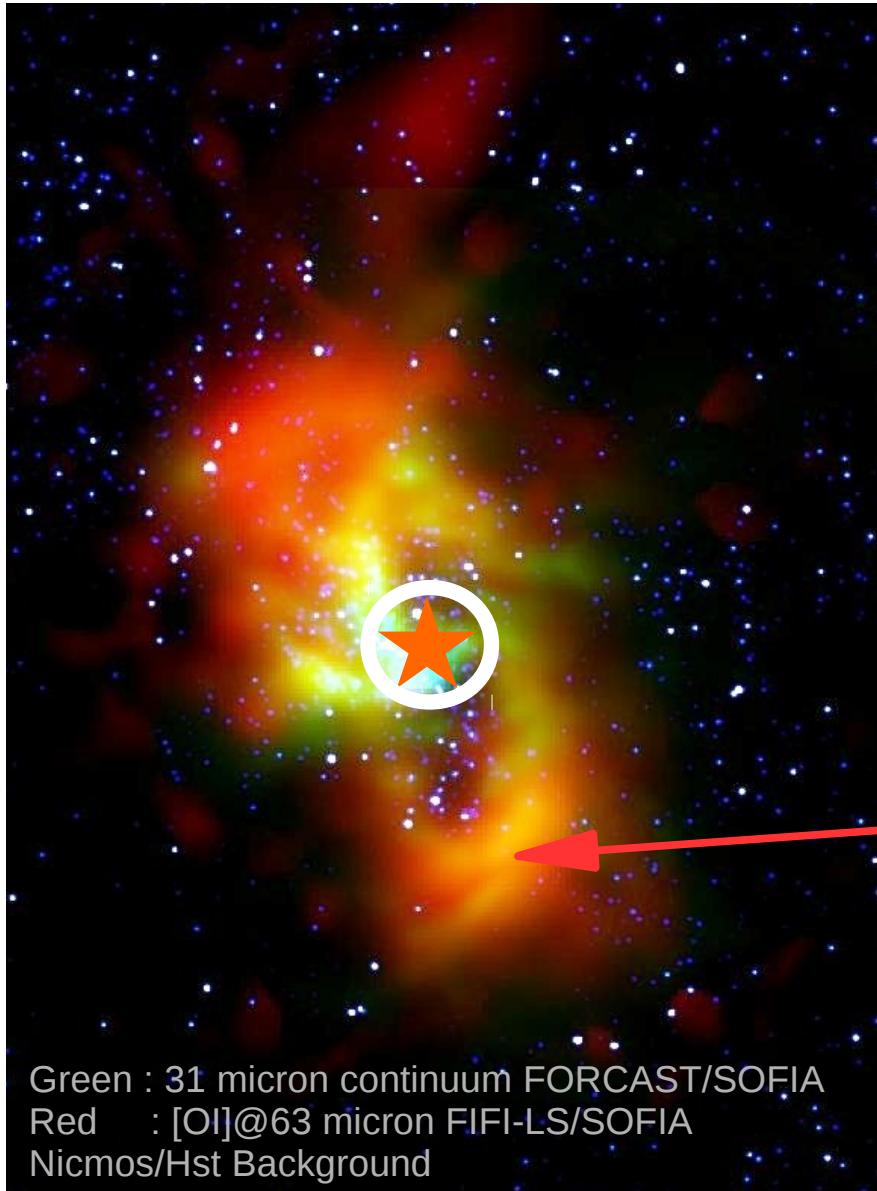
Observable in continuum and in molecular,
atomic and ionised transitions

Becklin et al. (1989)
Genzel et al. (1985)
Güsten et al. (1987)
Zhao et al. (2009)

...



Intro



- CNR is powered by ~200 young, massive stars in the inner 0.5 pc around Sgr A* (Krabbe et al. 1991, 1995, Paumard et al., 2006, ...)

- Those stars should not be there
'Paradox of Youth' (Ghez et al., 2003)

- Could the CNR be a star forming site?

- $M_{\text{Gas}} (< 2.5 \text{ pc}) \sim 10^{3.5} M_{\text{Solar}}$ (e.g., Mezger et al., 1989, 1996)

$$n_{\text{CNR}} > n_{\text{Roche}}(R) = 6 \times 10^{10} (R / 0.1 \text{ pc})^{-3} [\text{cm}^{-3}]$$

$$n_{\text{Roche}}(R=1 \text{ pc}) = 6 \times 10^7 \text{ cm}^{-3}$$

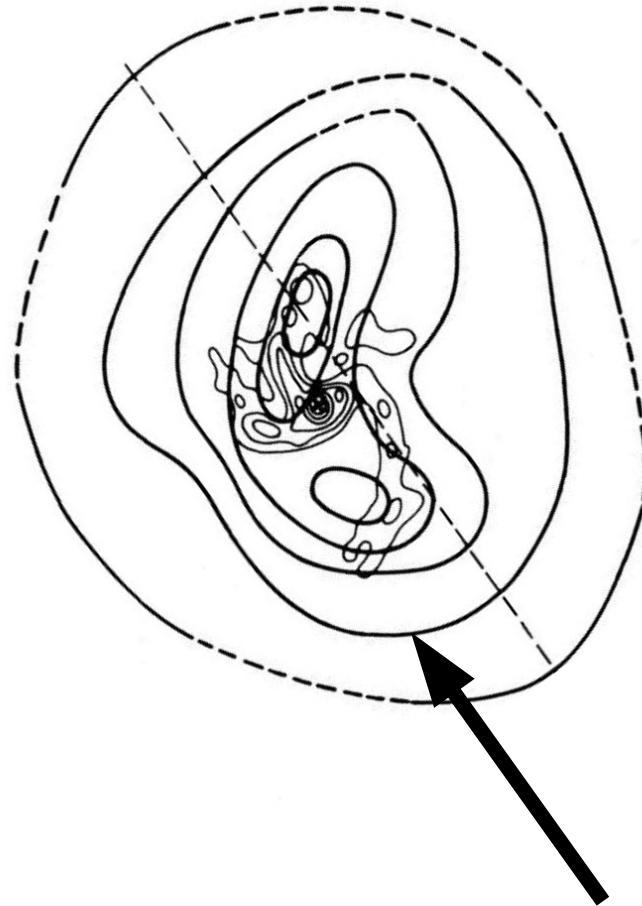
- CNR is a photodissociation region (PDR)

- Compare measured cooling line ratios with modelled ones to determine FUV and n_{CNR} (Kaufman et al., 1999)

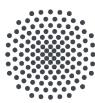


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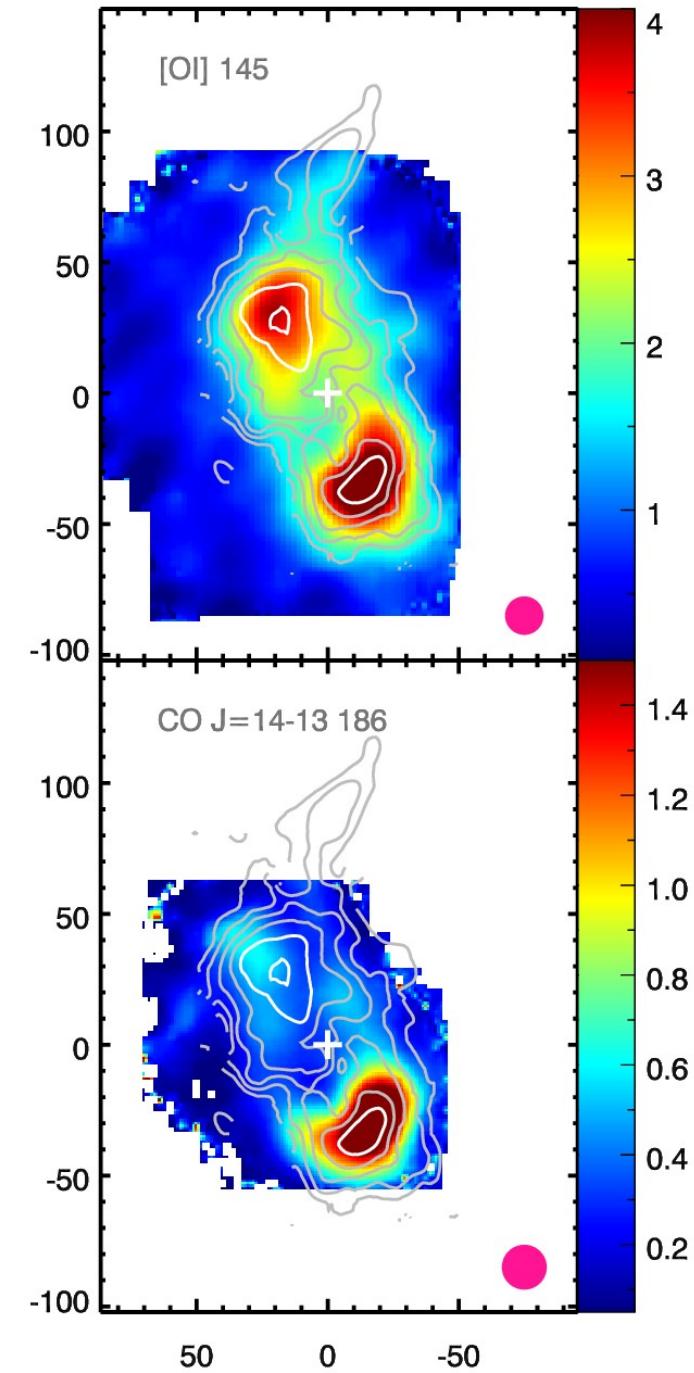
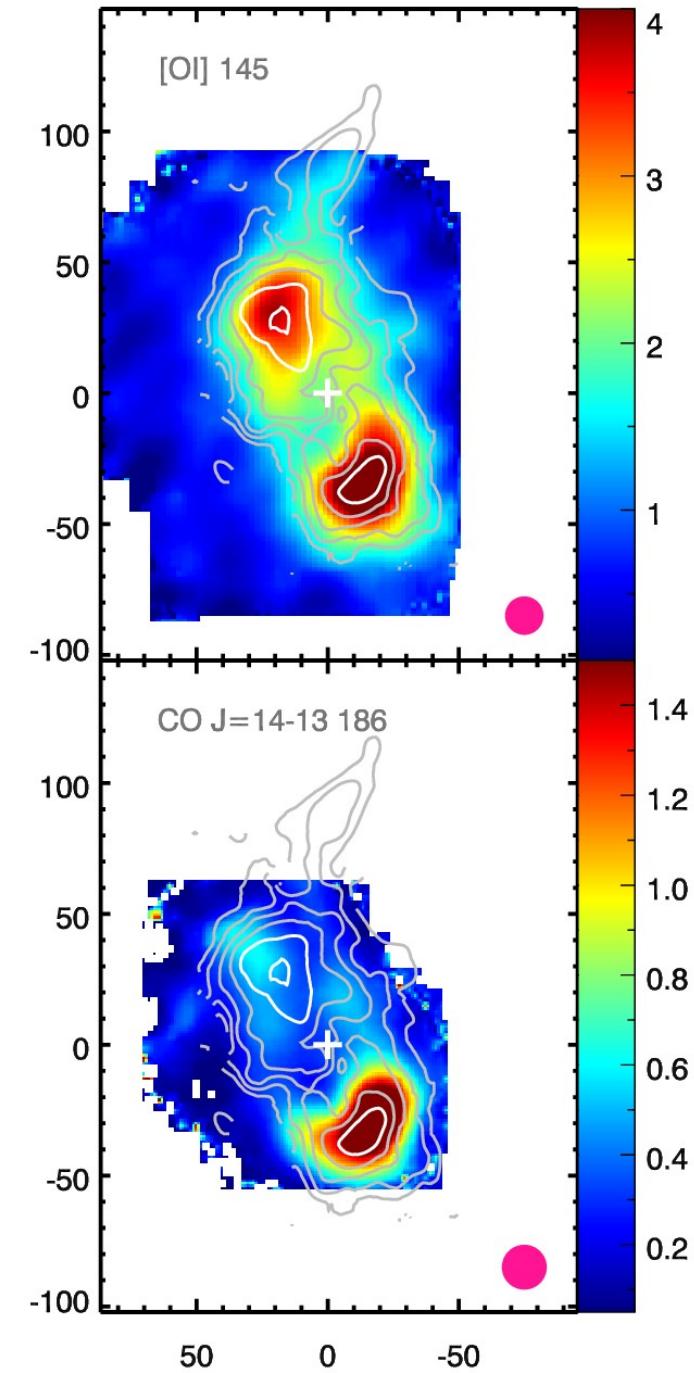
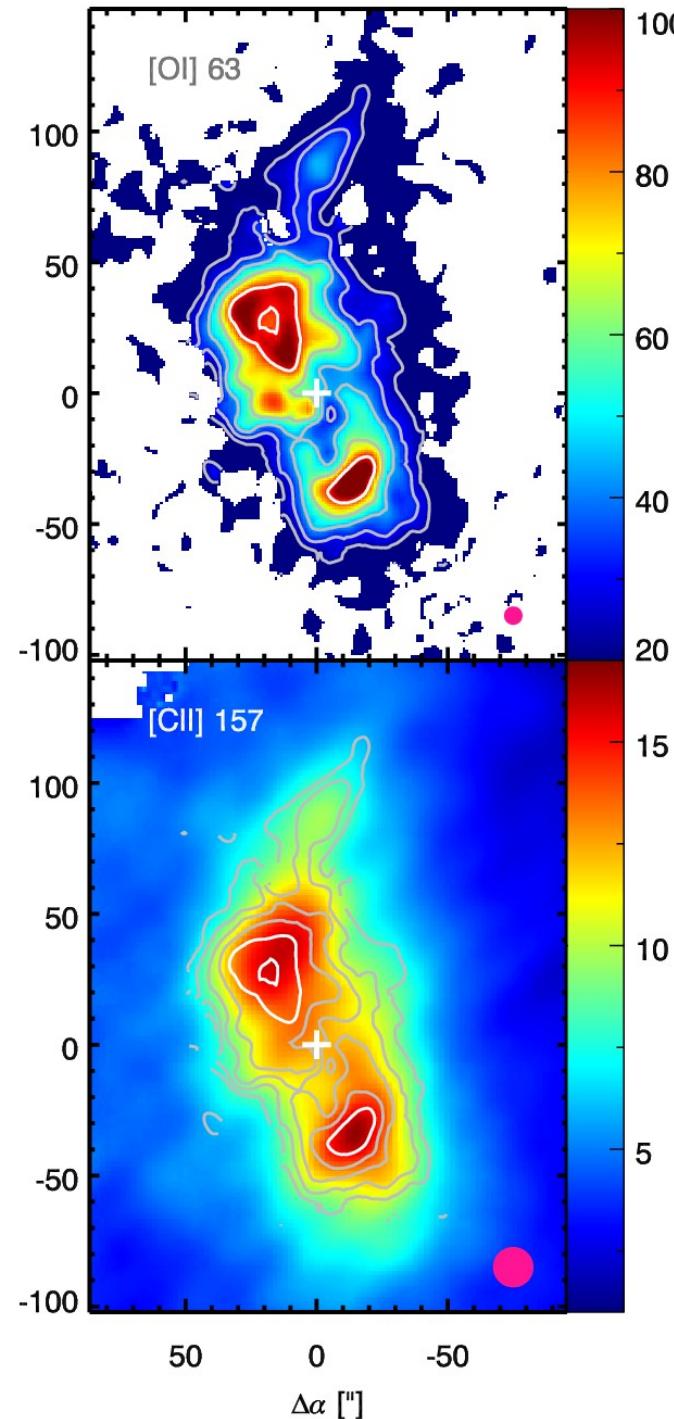
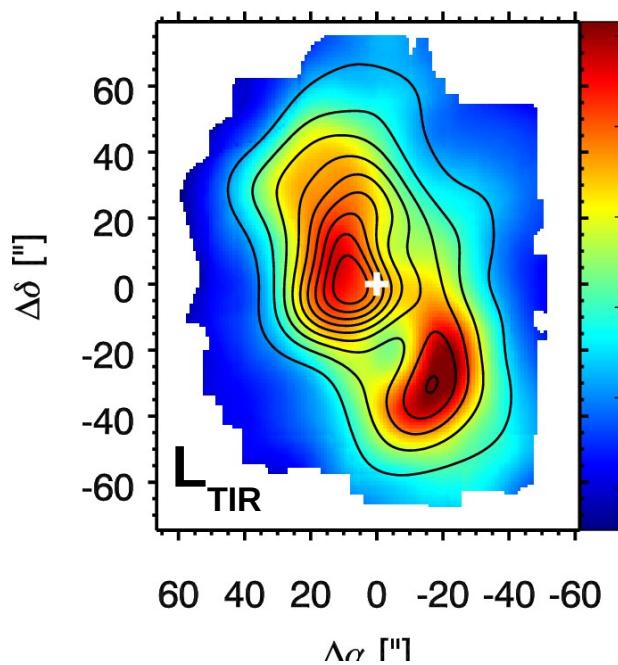
[OI]@63
**University of California, Berkeley,
Tandem Fabry-Perot**
Genzel et al., 1985

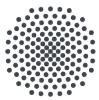


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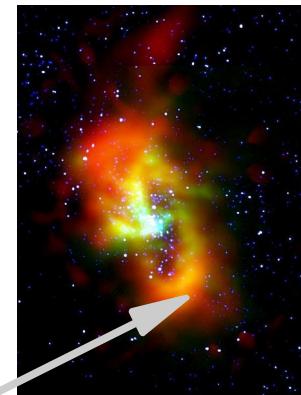
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CNR observed with FIFI-LS

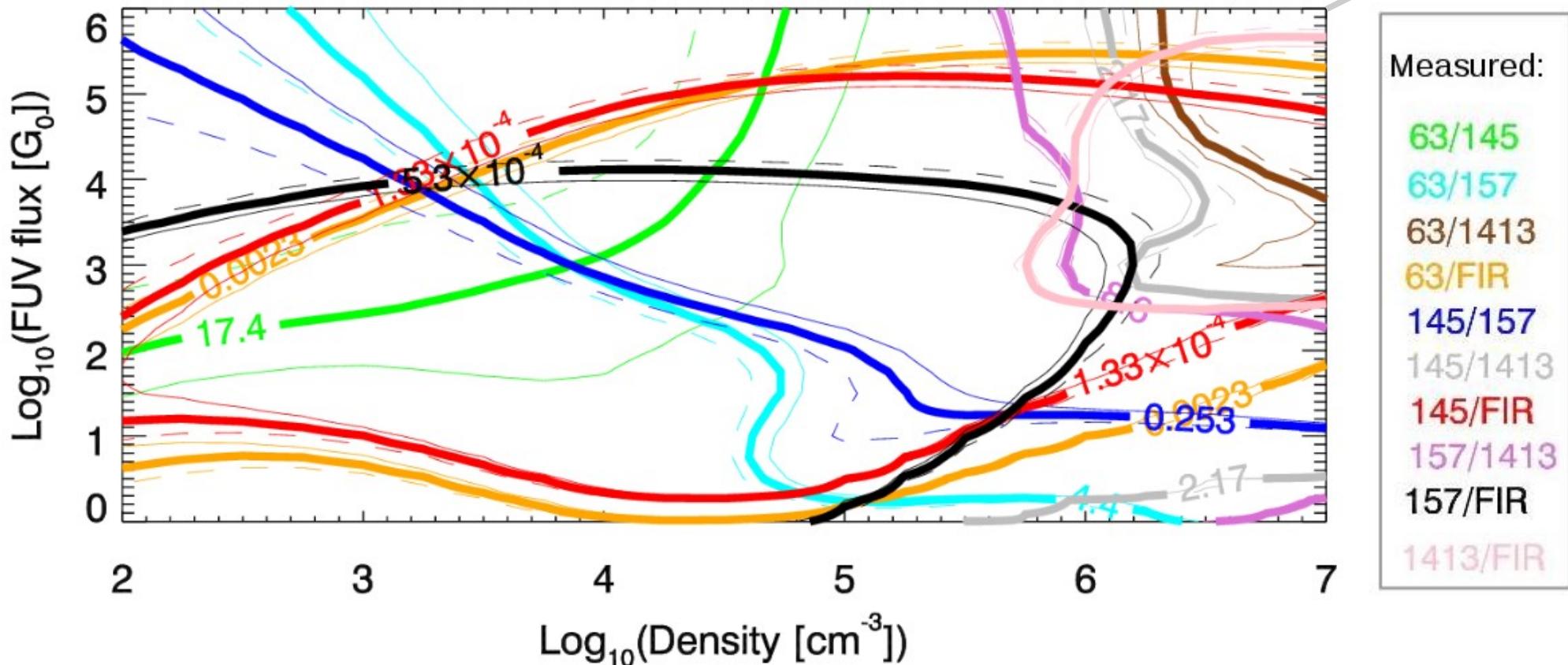




PDR analysis



Density-FUV predictions for the Southern lobe



But, we see a mixture of different phases (FUV, n)
E.g., [OI] 63 is well absorbed in cool foreground environments
[CII] contributions from low density environments and HII regions



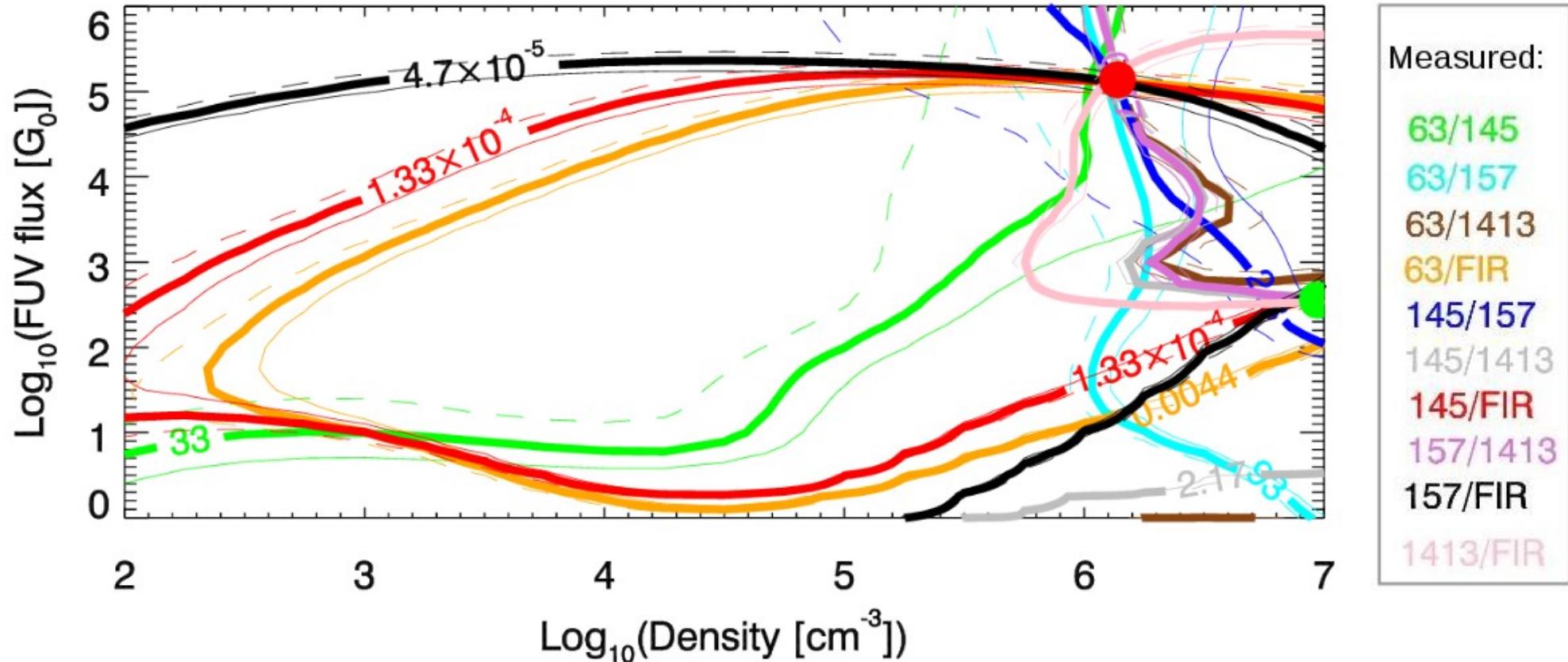
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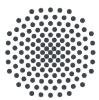
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PDR analysis

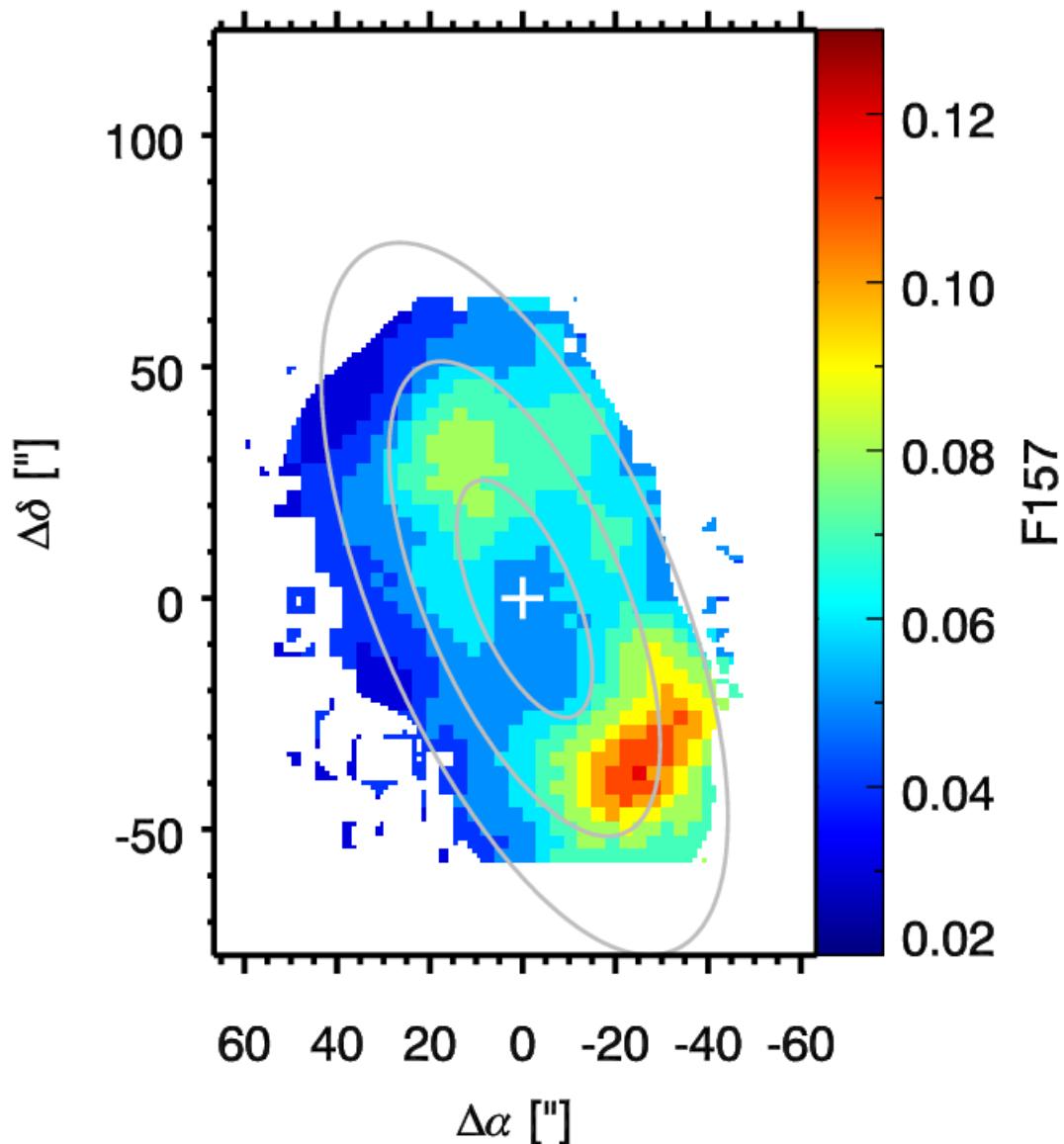
Scale [OI]@63 with F63 factor and [CII]@157 with F157 factor and take other tracers as are:

Scaled Density-FUV predictions for the Southern lobe

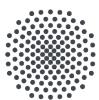




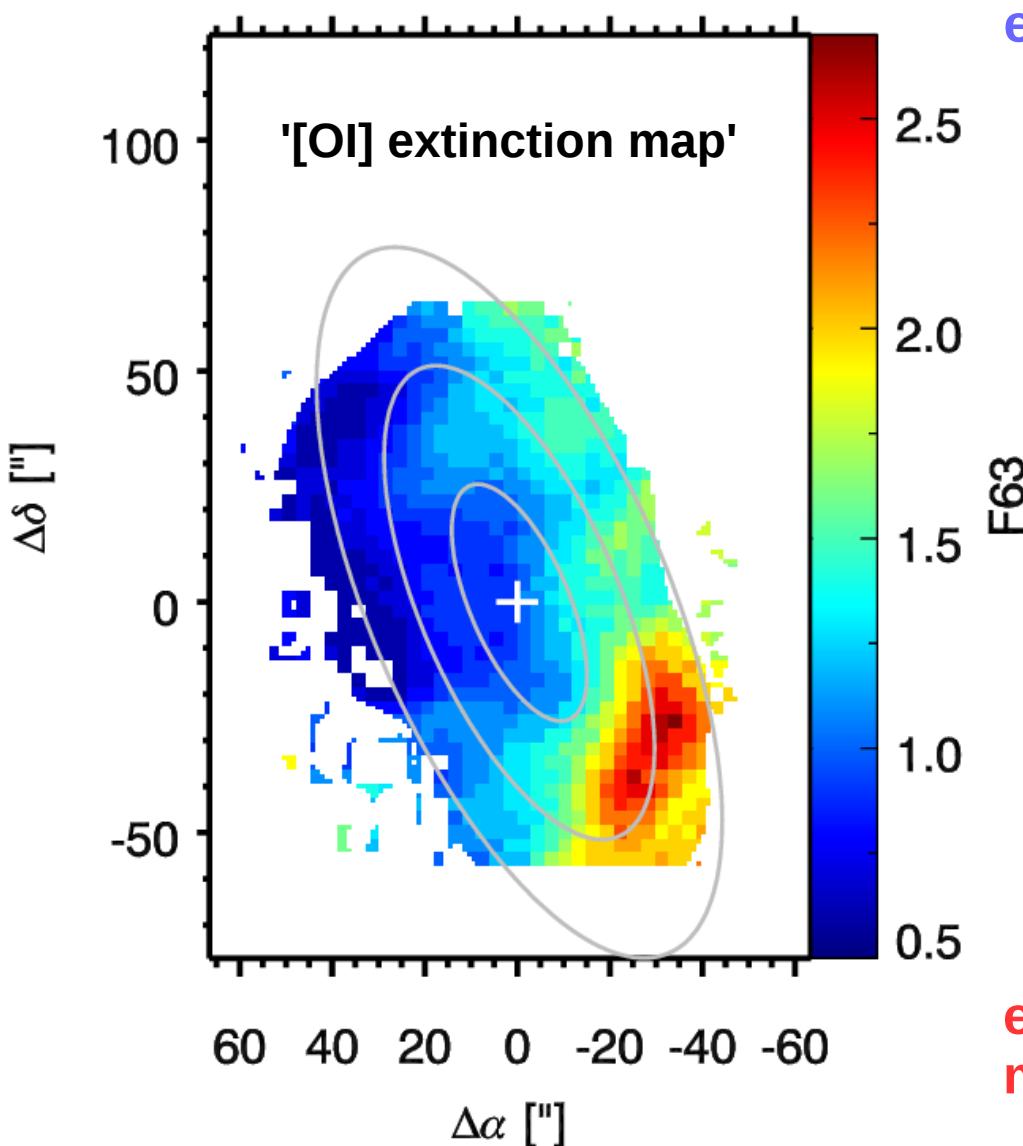
Results



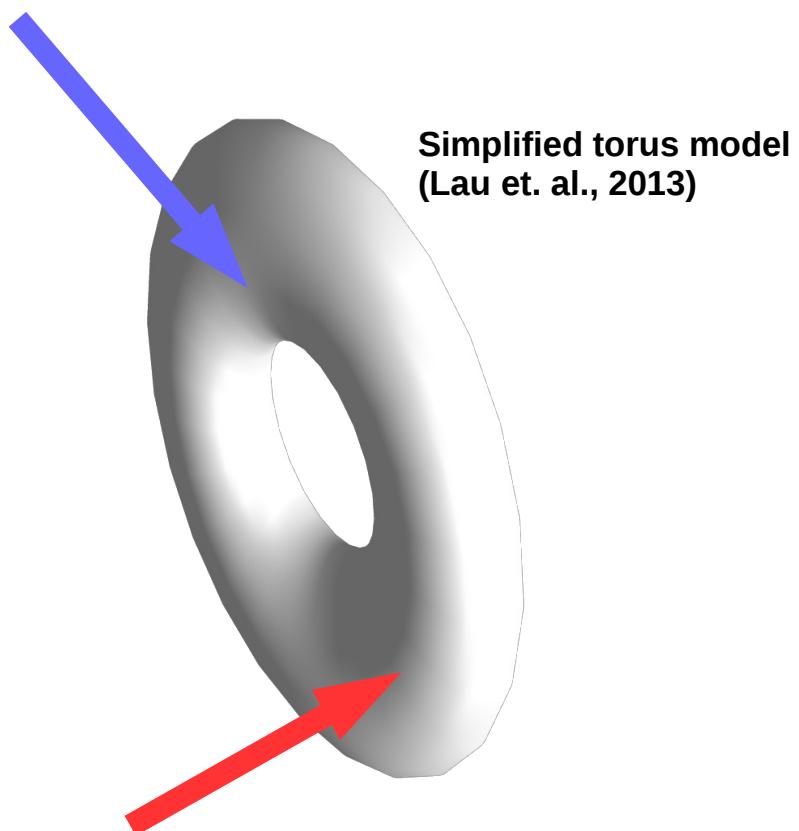
**F157 < 0.1 : ~90% of [CII] emission
comes from less dense gas
or HII**



Results



e.g., [OI] is unobscured



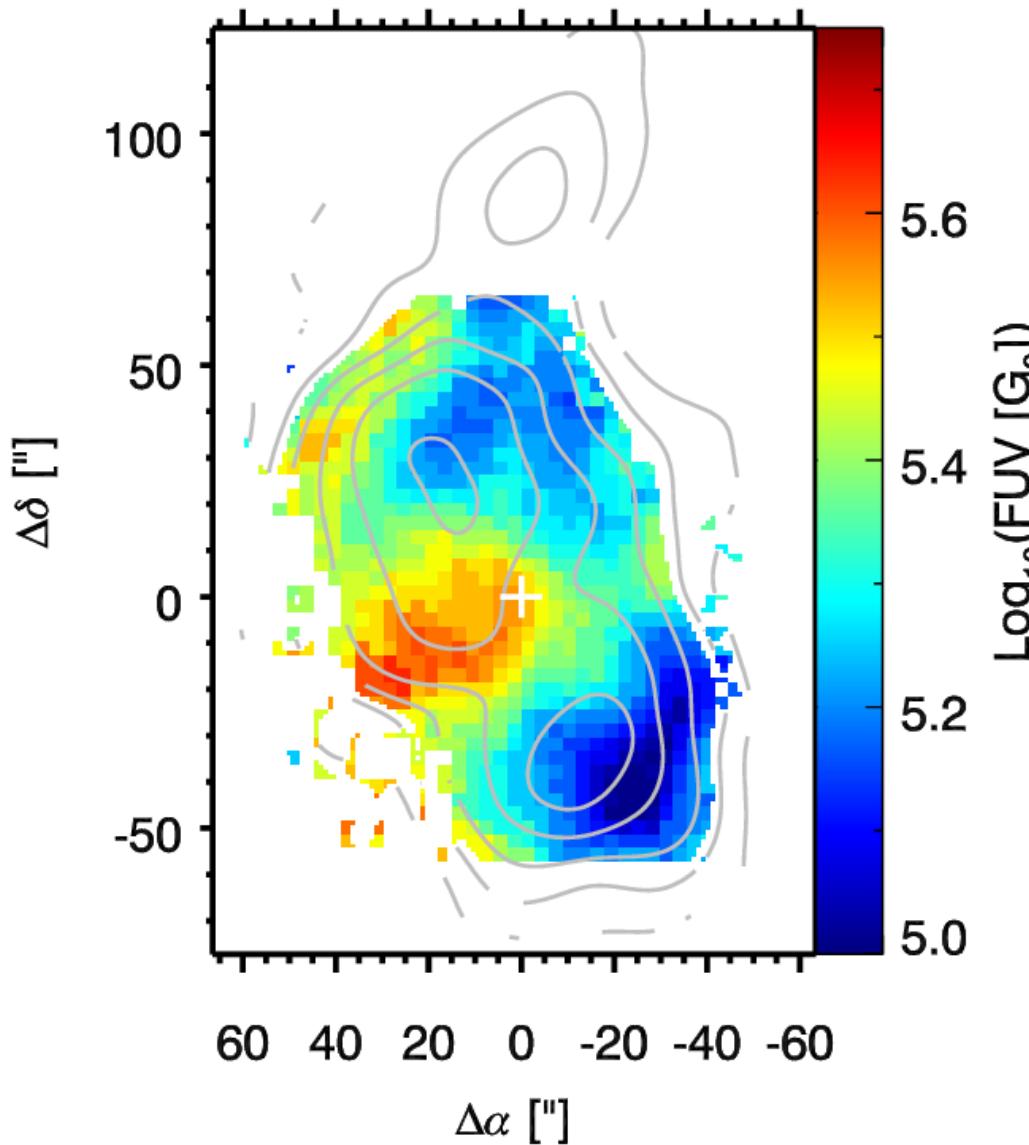
e.g. $F63 = 2 \rightarrow 50\% \text{ of [OI] emission missing, obscuration by streamer/torus ?}$



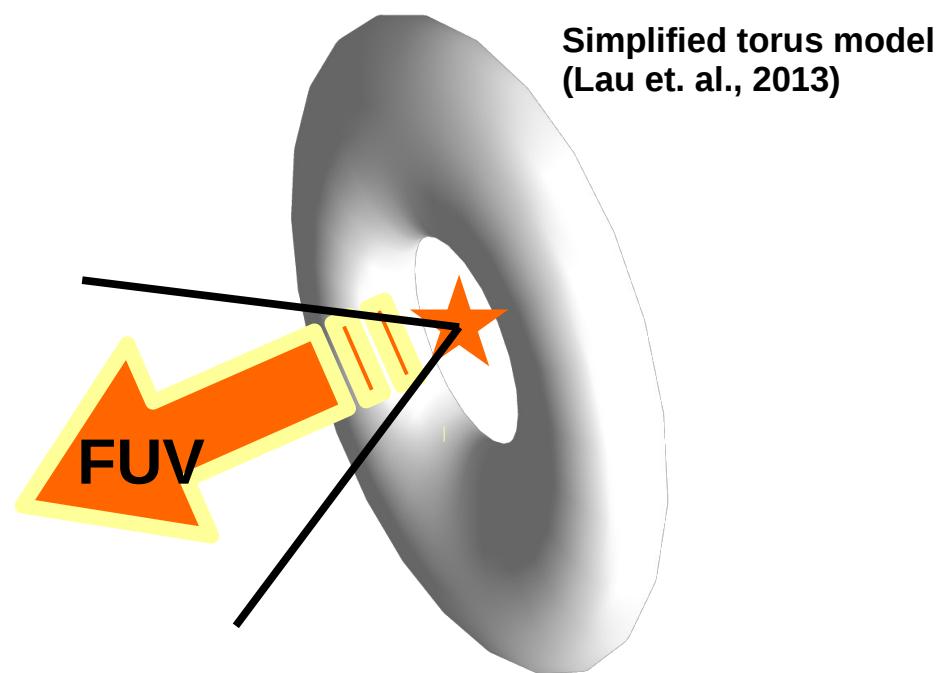
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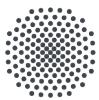
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Results

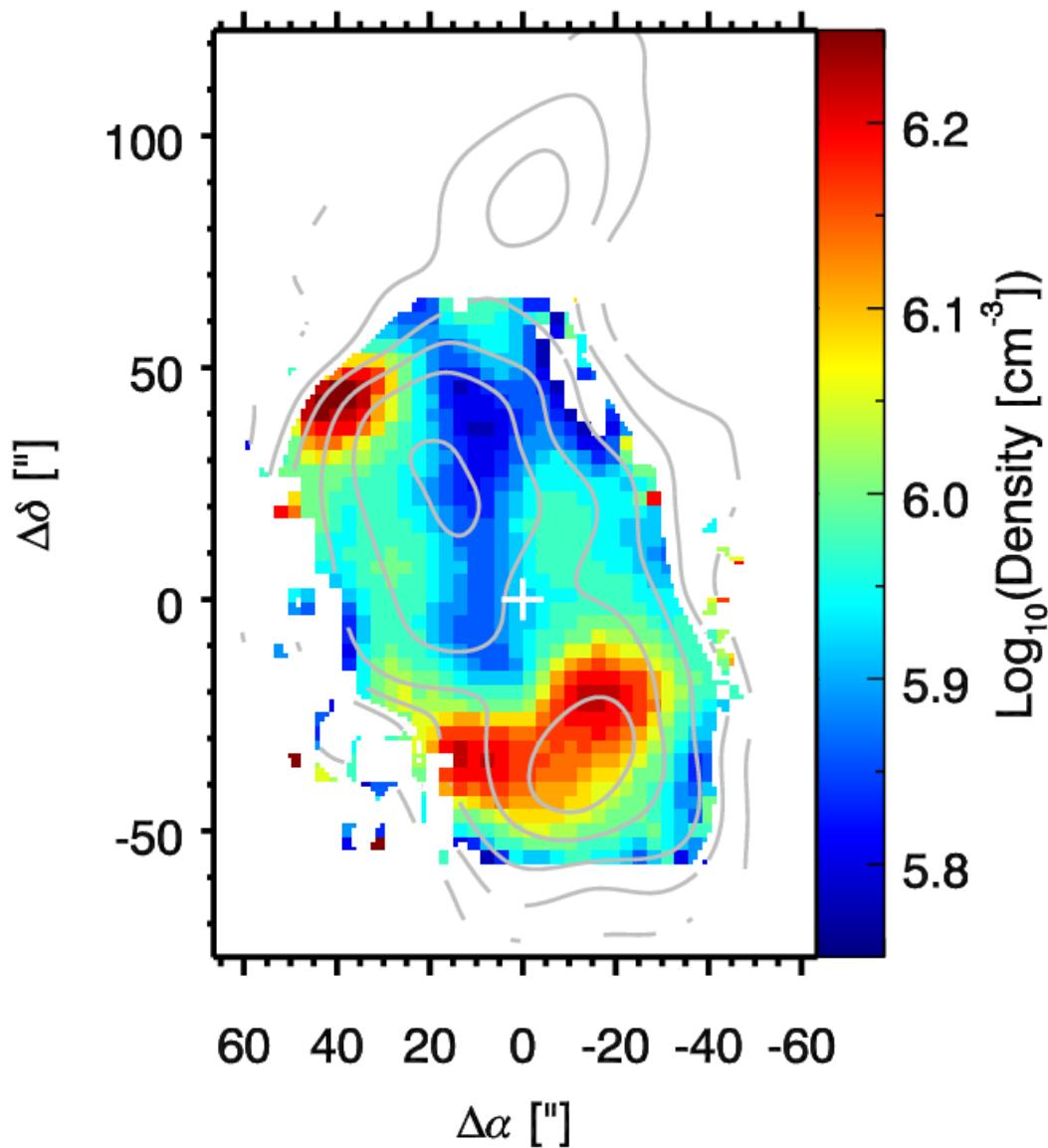


FUV between 10^5 and $10^{5.6} G_0$
(Southern lobe : $10^{4-5} G_0$ as calculated
from stellar types, Harada et al., 2015)



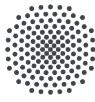


Results



Densities between $10^{5.6}$ and $10^{6.3} \text{ cm}^{-3}$
Densities are generally below Roche limit

→ CNR is currently not a suitable starforming site



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Thanks



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Alan Meyer (flight planner) and the pilots
Ryan Lau
Volker Ossenkopf-Okada, Markus Röllig
And many more ...