

large scale galactic structure and nearby galaxies

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and all those who kindly gave material



image credit: M. Galametz, KINGFISH

the Herschel legacy for nearby galaxies and galaxy structure

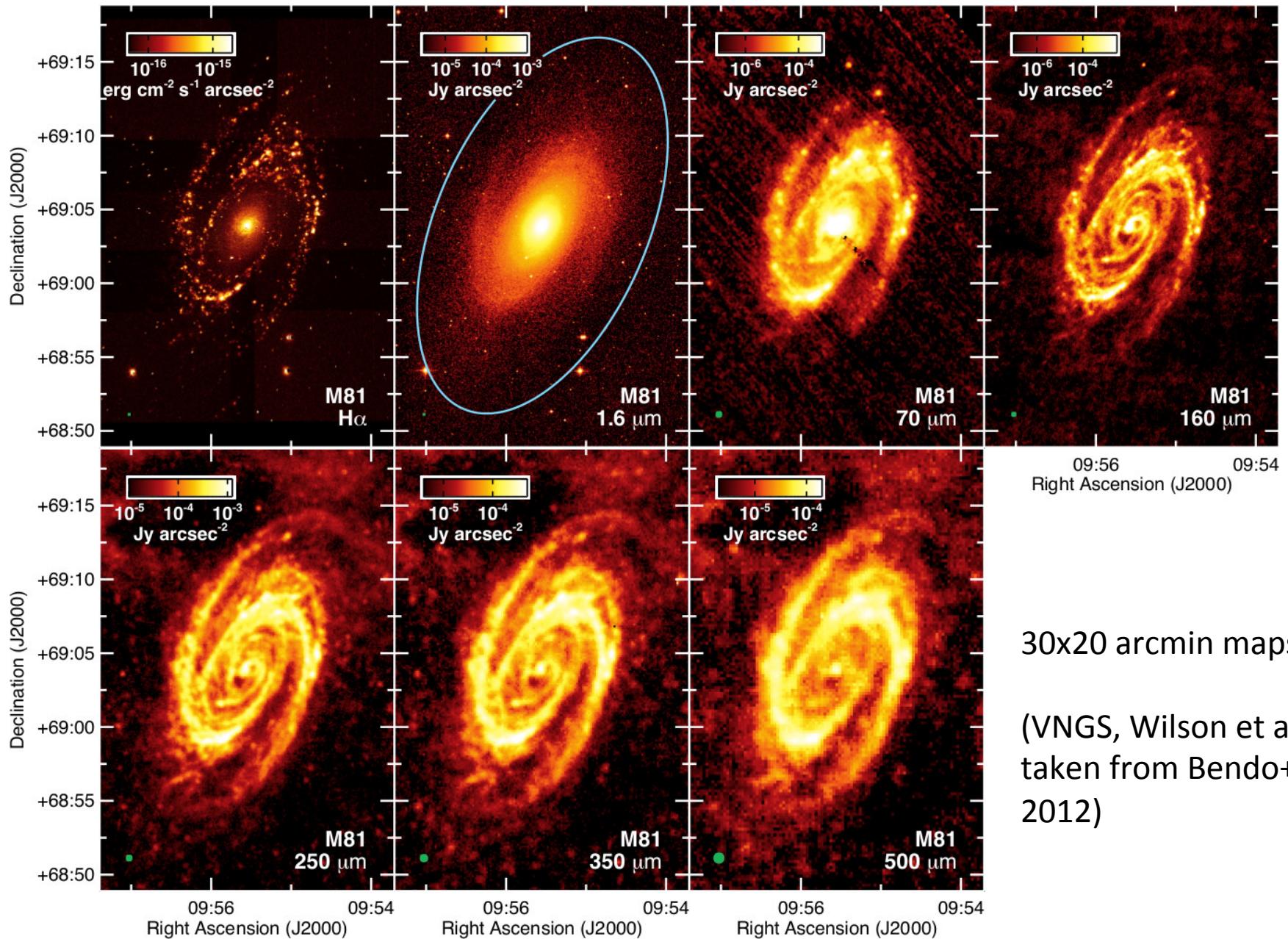
- **Spatial resolution in the Local Universe:** resolved dust maps and more accurate dust masses because of longer wavelengths. Use dust to trace ISM.
- **Spatially resolved energy budget in the ISM:** heating and cooling on a local scale with [CII], [OIII], [NII] dust continuum maps.
- **ISM diagnostics from molecules:** CO cooling curves, shocks and H₂O emission
- **AGN feedback in local ULIRGs:** P-Cygni profiles of molecular transitions with PACS.

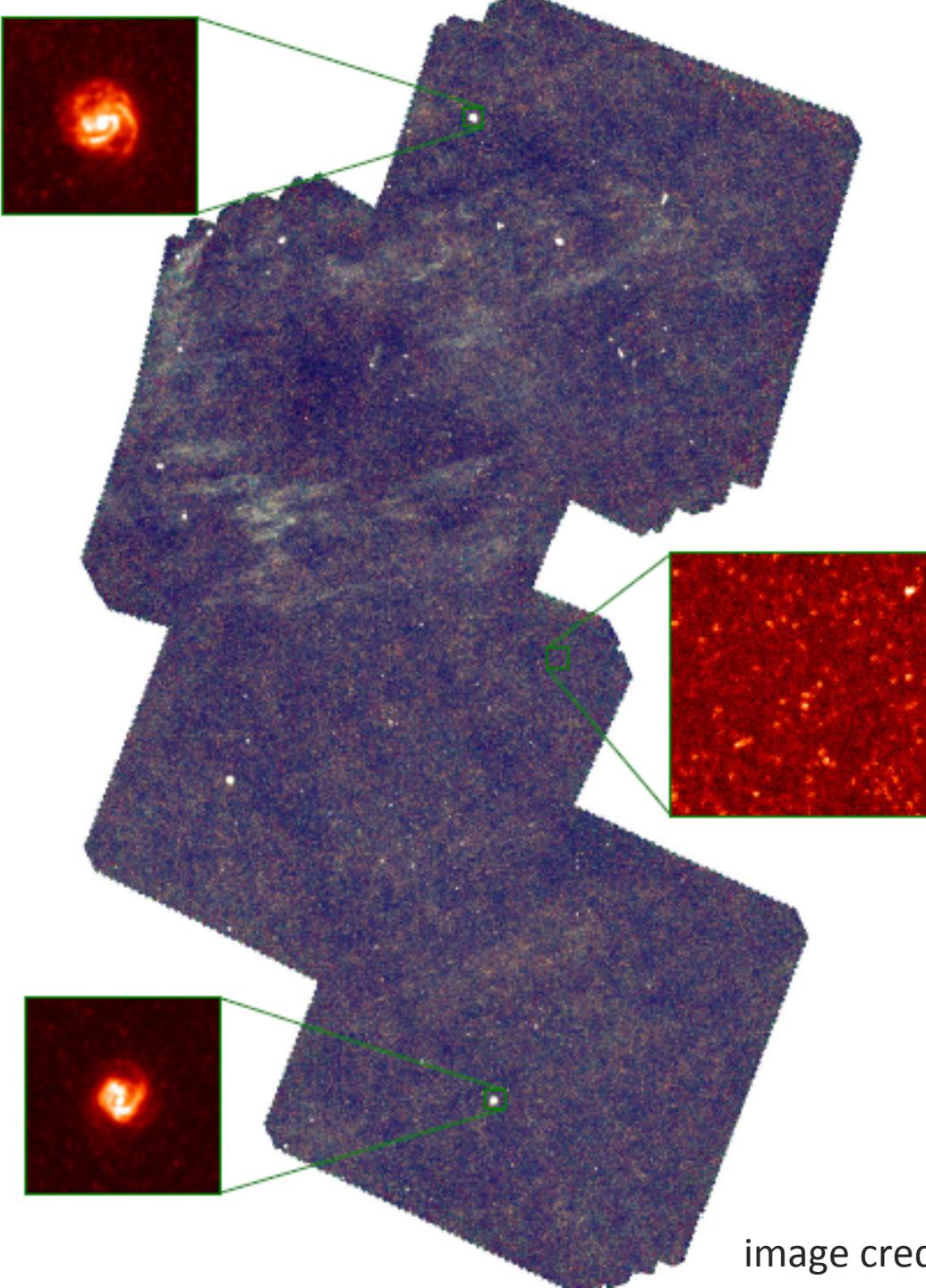
spatial resolution

M 104

MIPS24, PACS 160, SPIRE
composite (KINGFISH, image
credit M. Galametz)

M81 dust at \sim 600 pc resolution



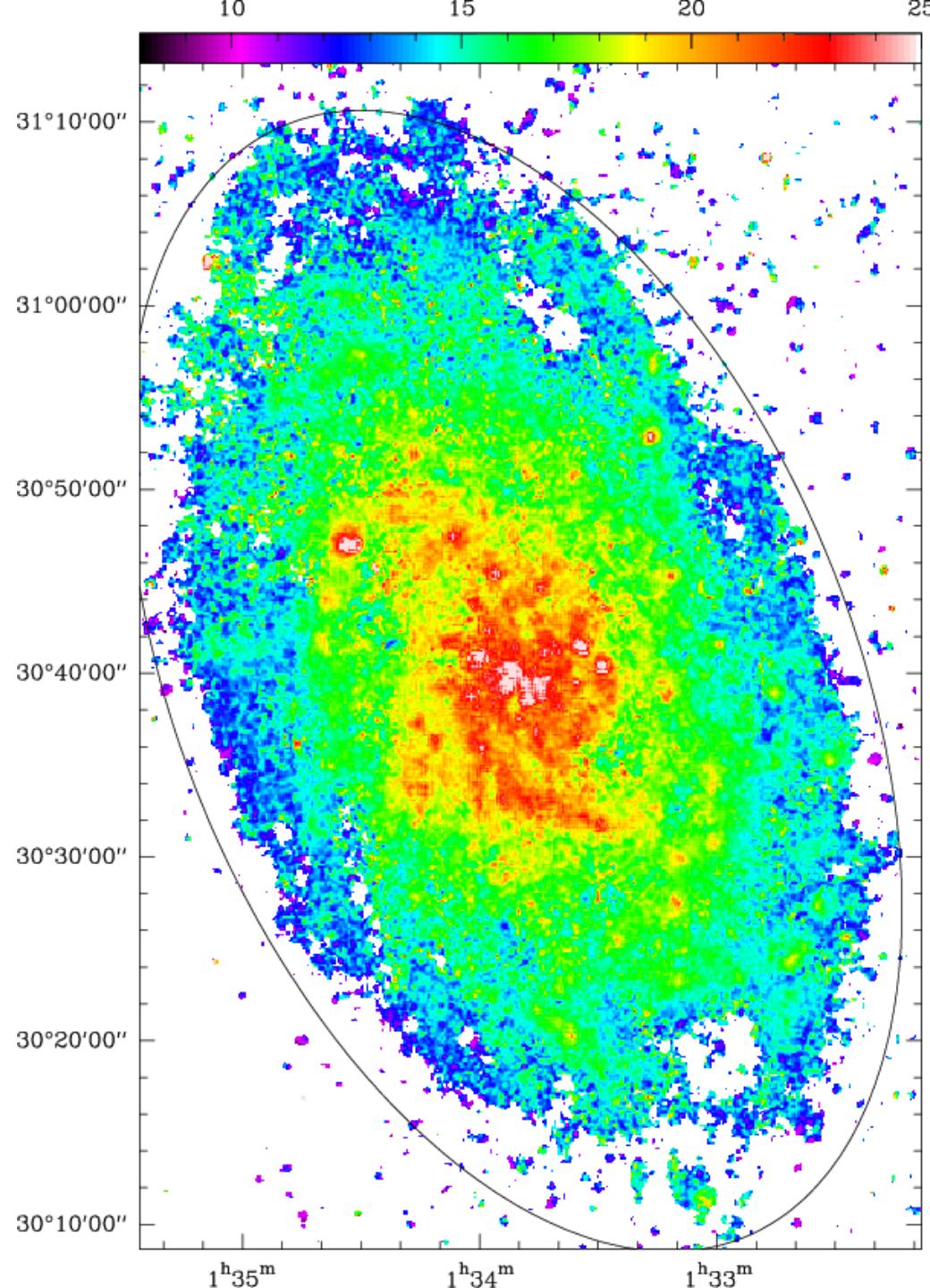


Unprecedented view of the Virgo cluster in a 64 deg^2 map from 100 to 500 μm

HeViCS (Davies et al.) together with HRS (Boselli, Eales et al.), enables study of early-type galaxies in an unbiased way

image credit M. Smith

Map of color temperature in M33 at ~100 pc resolution



HerM33es, Cramer
et al., taken from
Braine+ 2012

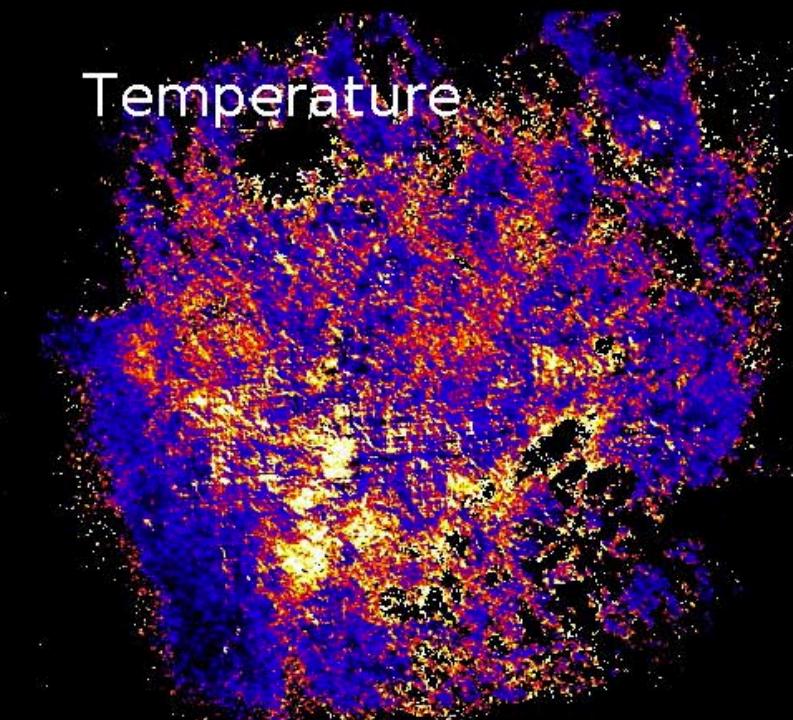
(see also HELGA for
M31, Fritz+ 2012)

LMC - Fitting Results

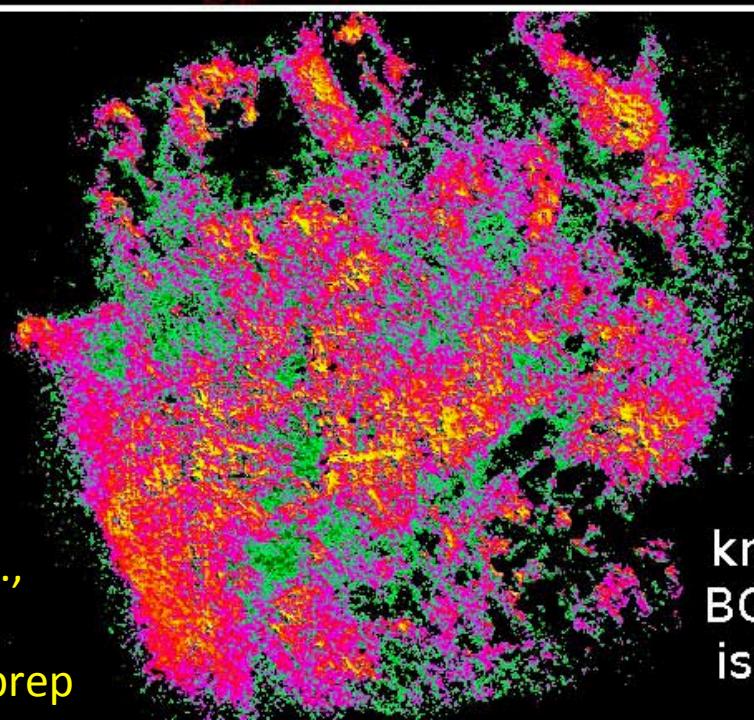
Mass



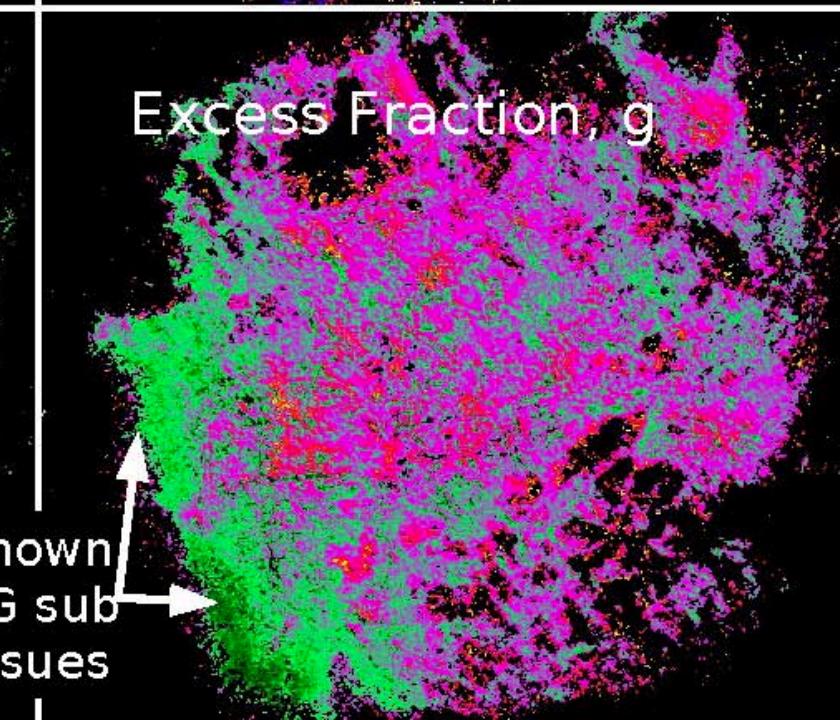
Temperature



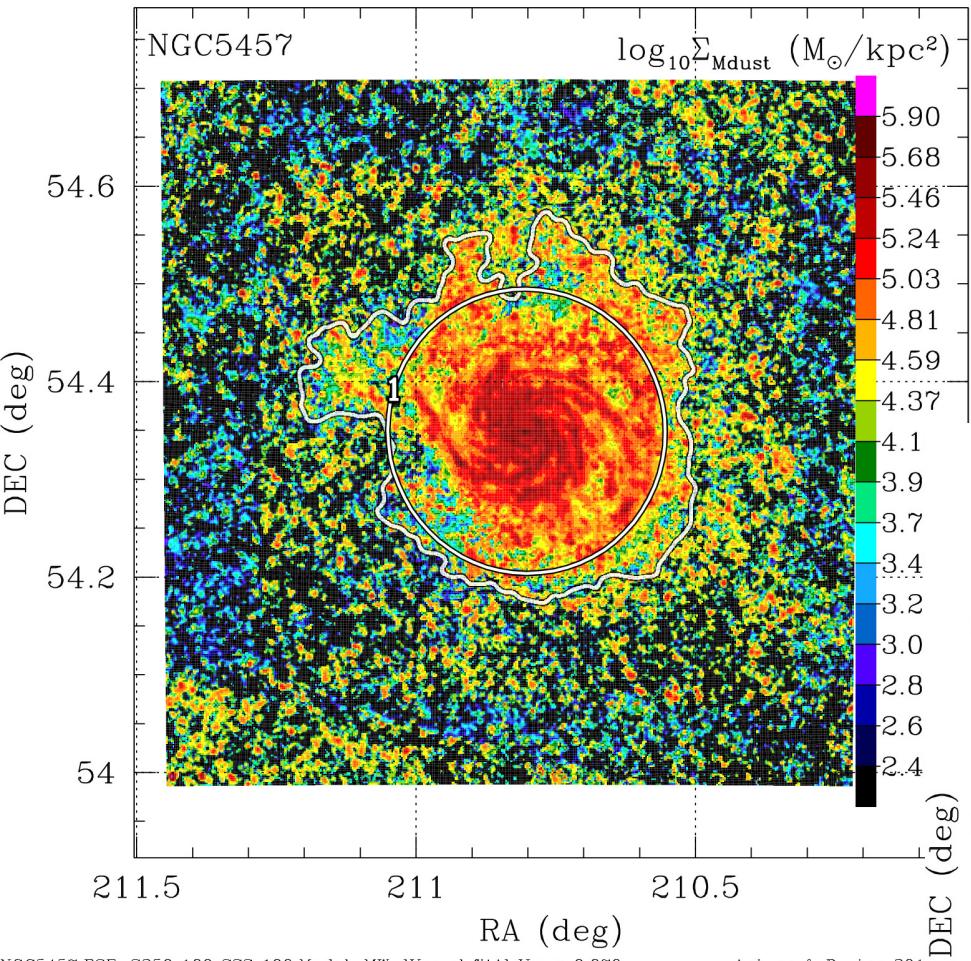
β



Excess Fraction, g

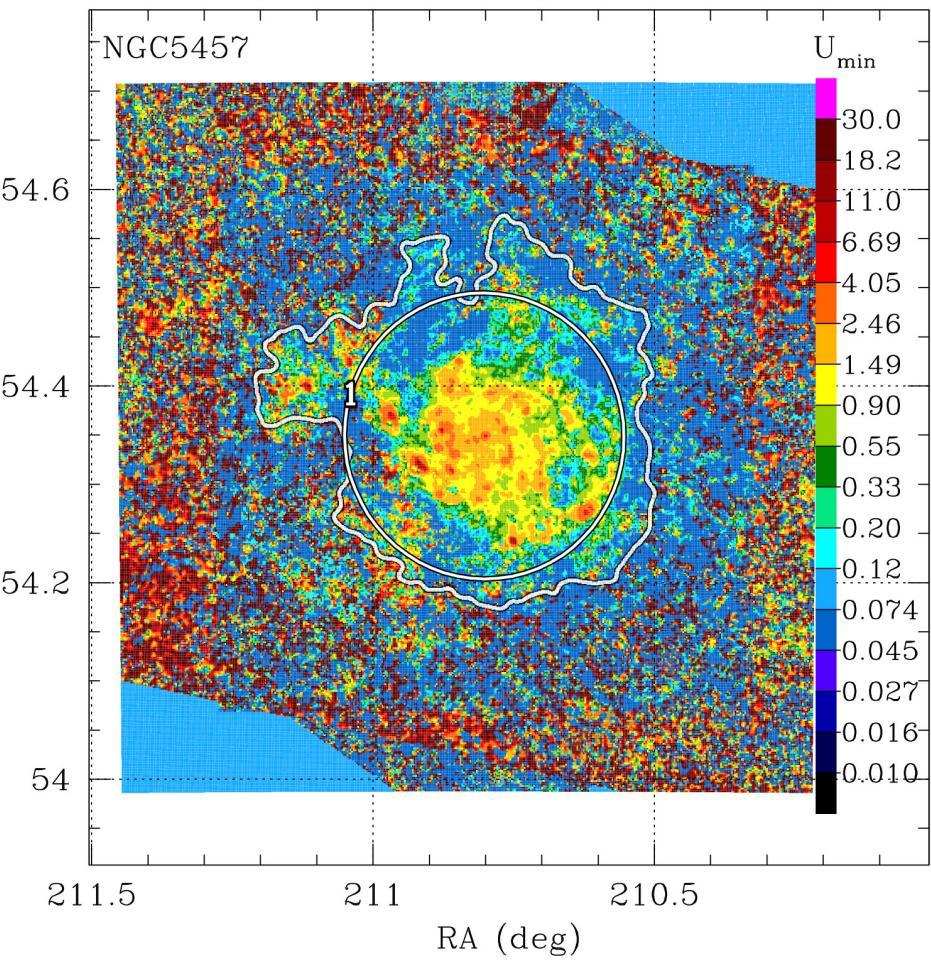


HERITAGE,
Meixner et al.,
taken from
Gordon+, in prep



M 101

dust mass surface density
maps at 500 pc resolution



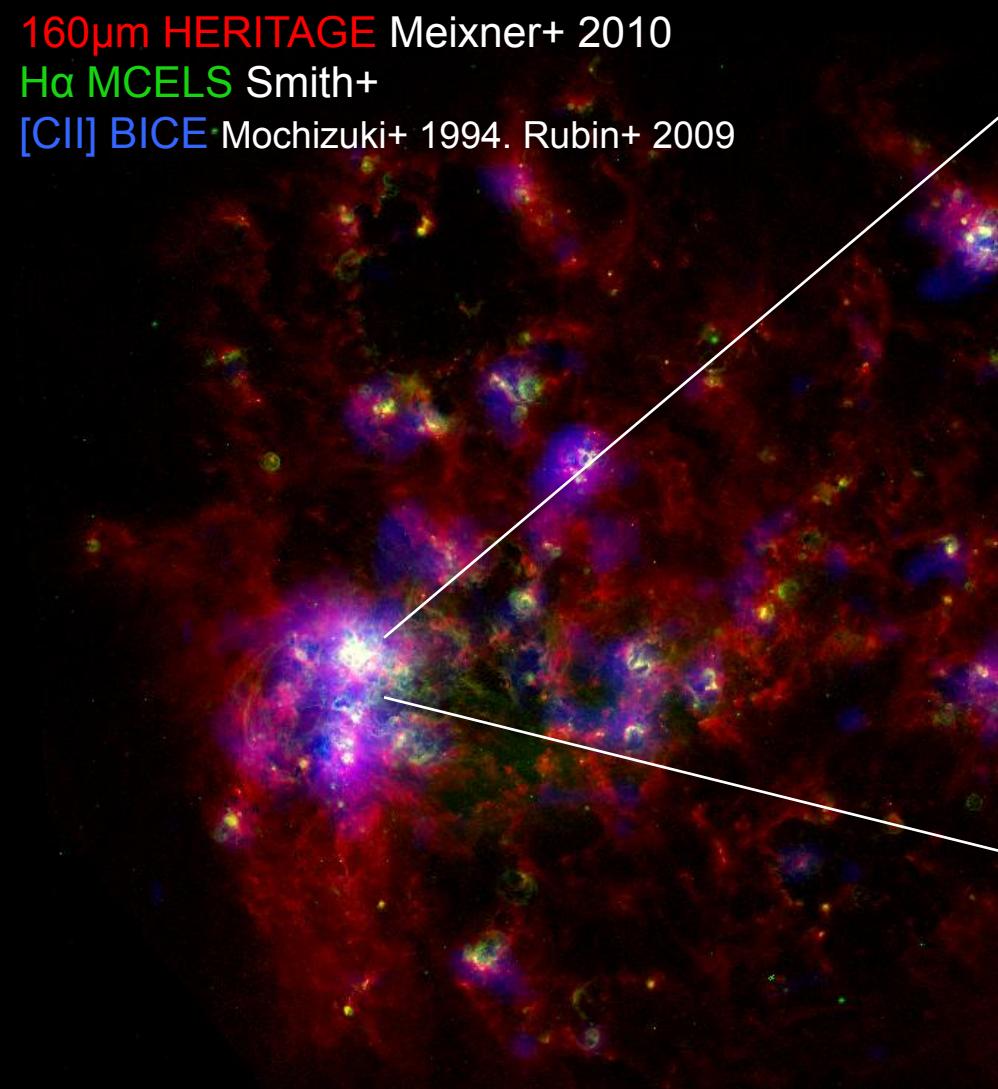
Dust mass and minimum radiation field
 U_{min} with Draine & Li (2007) models

KINGFISH, Kennicutt et al., taken from
Aniano+, in prep.

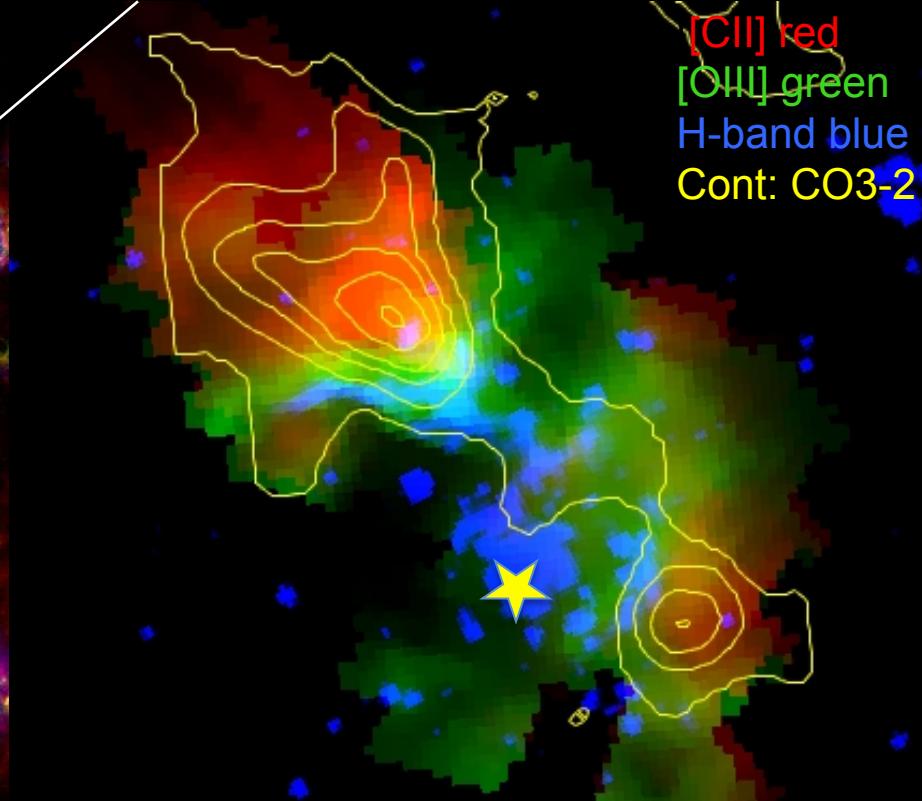
spatially resolved energy
budget

30 Dor in LMC, PDRs on \sim 10 pc scales

160 μ m HERITAGE Meixner+ 2010
H α MCELS Smith+
[CII] BICE Mochizuki+ 1994. Rubin+ 2009



DGS, Madden et al., taken from Chevance+ 2013

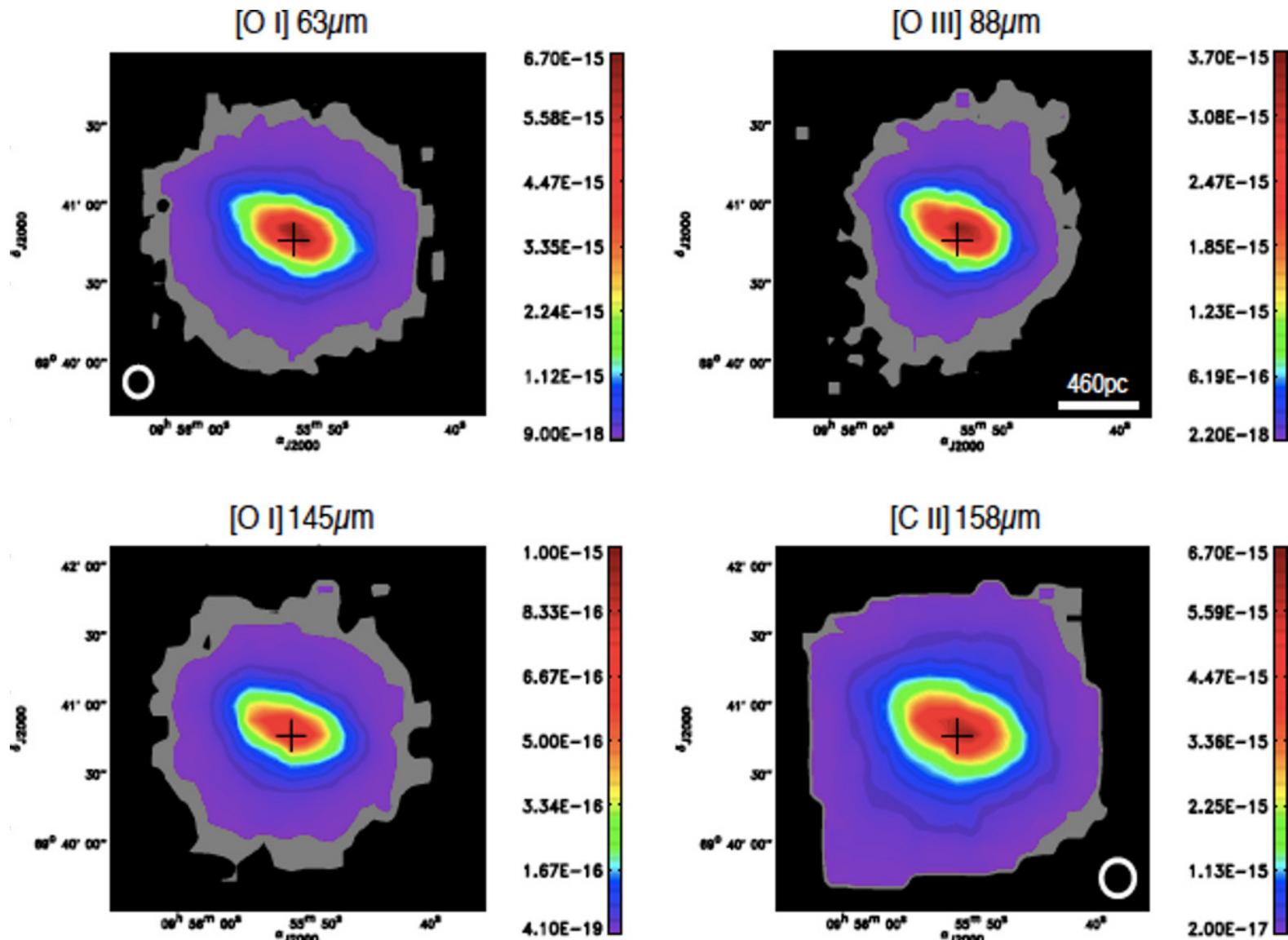


PACS maps:
[CII] 158 μ
[OI] 63 and 145 μ
[OIII] 88 μ
[NII] 122 205 μ
SPIRE FTS:
[NII] 205 μ
[CI] 370 and 609 μ

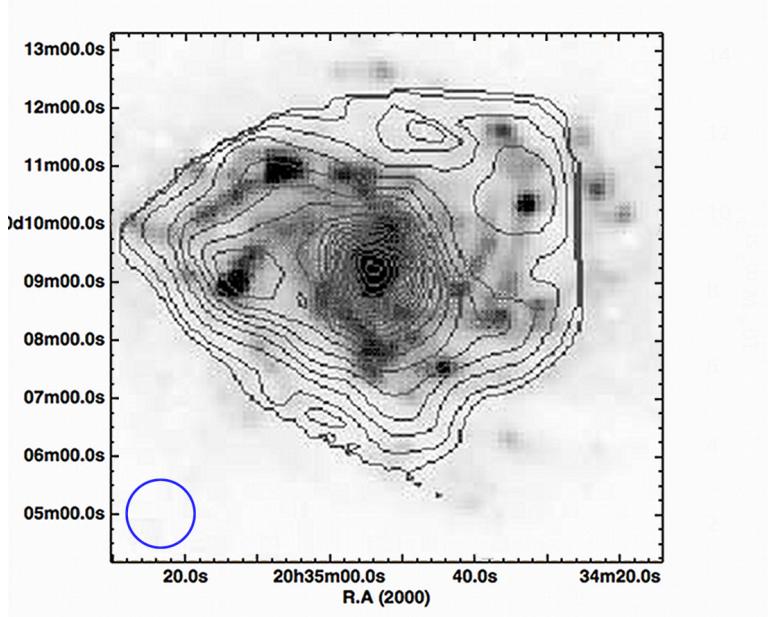
[CII] red
[OIII] green
H-band blue
Cont: CO3-2

Starburst-driven outflow in M82 at a resolution of 300 pc

Integrated
line
emission at
original
spatial
resolution

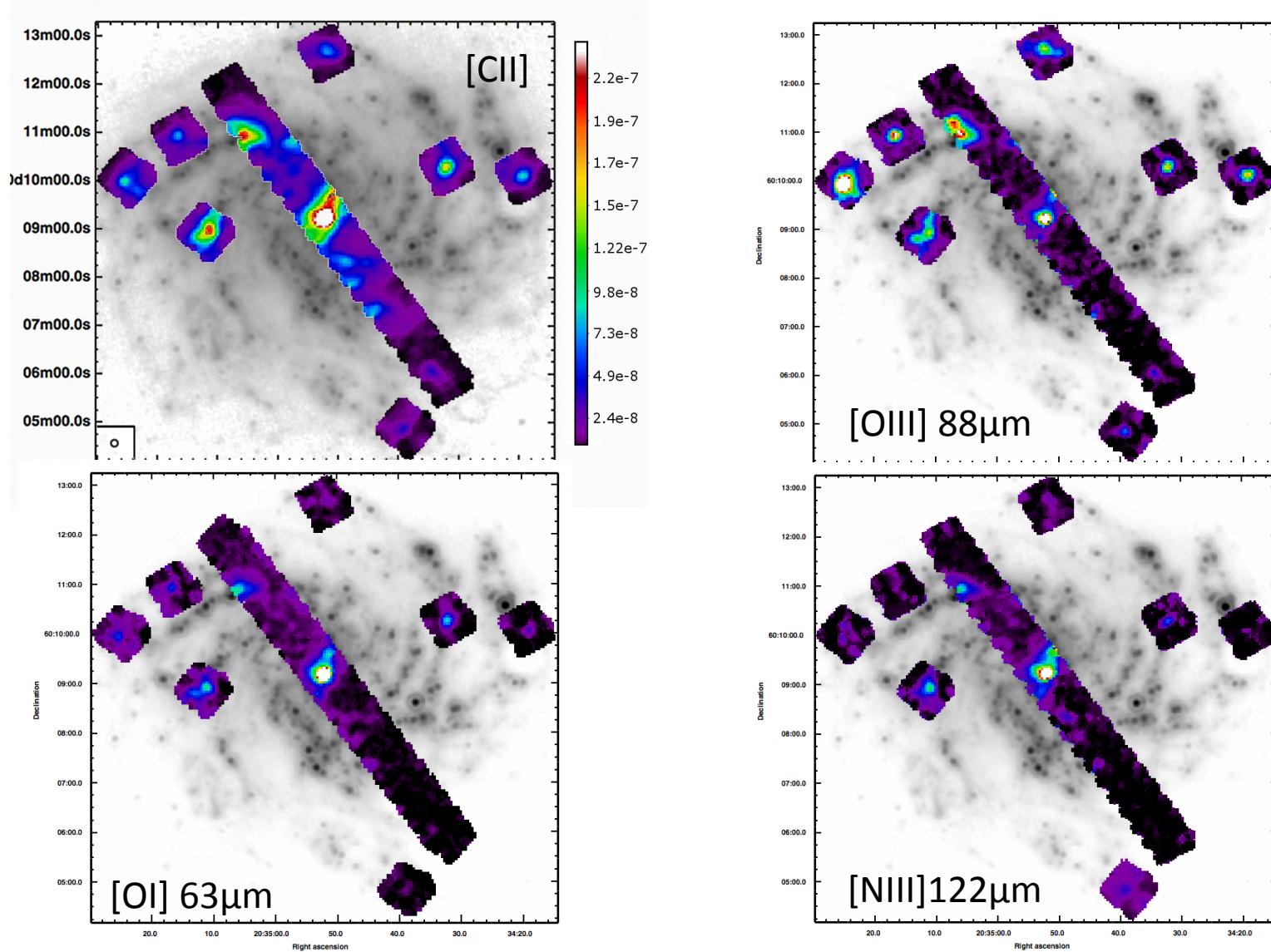


Spiral arms and HII regions in NGC 6946 at ~400 pc scales



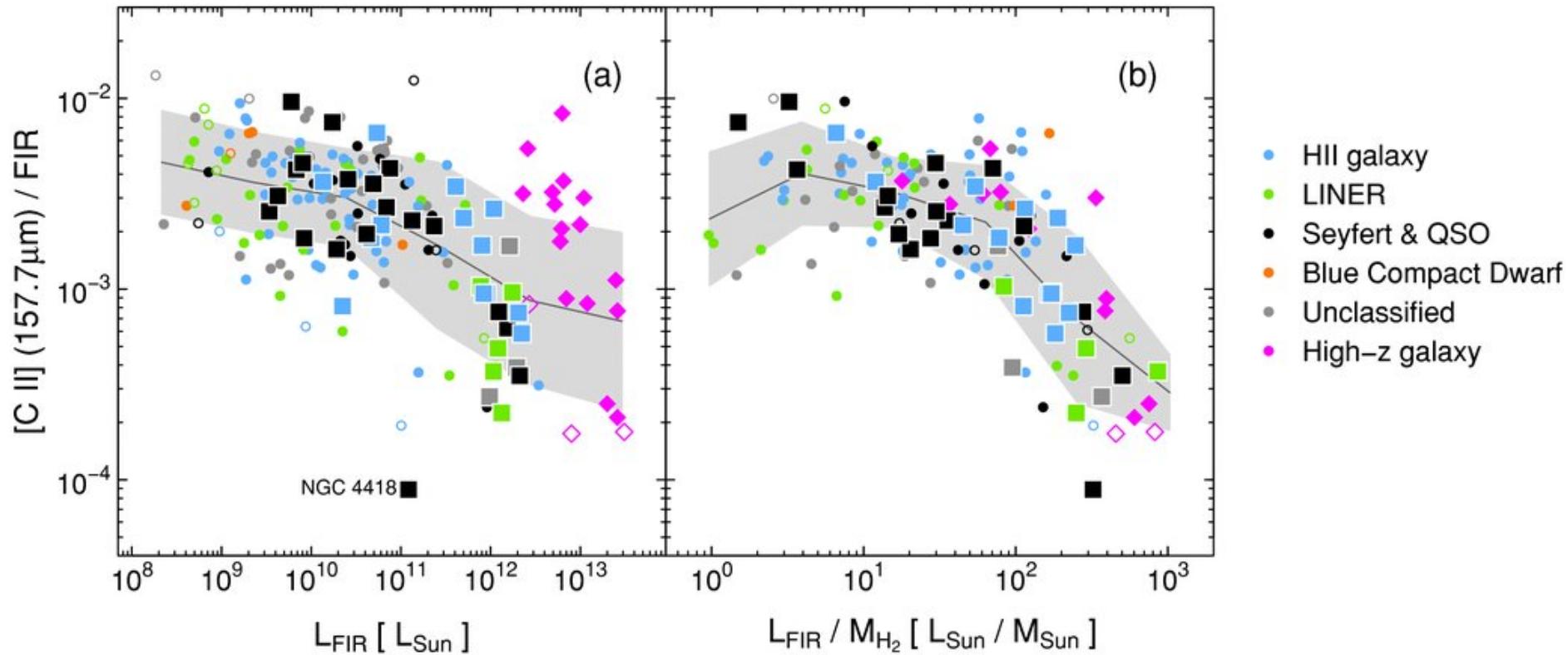
ISO [CII] from Contursi+
(2002), resolution 5
times worse than PACS

Spiral arms and HII regions in NGC 6946 at ~400 pc scales



KINGFISH, Kennicutt et al., taken from Croxall+, in prep.

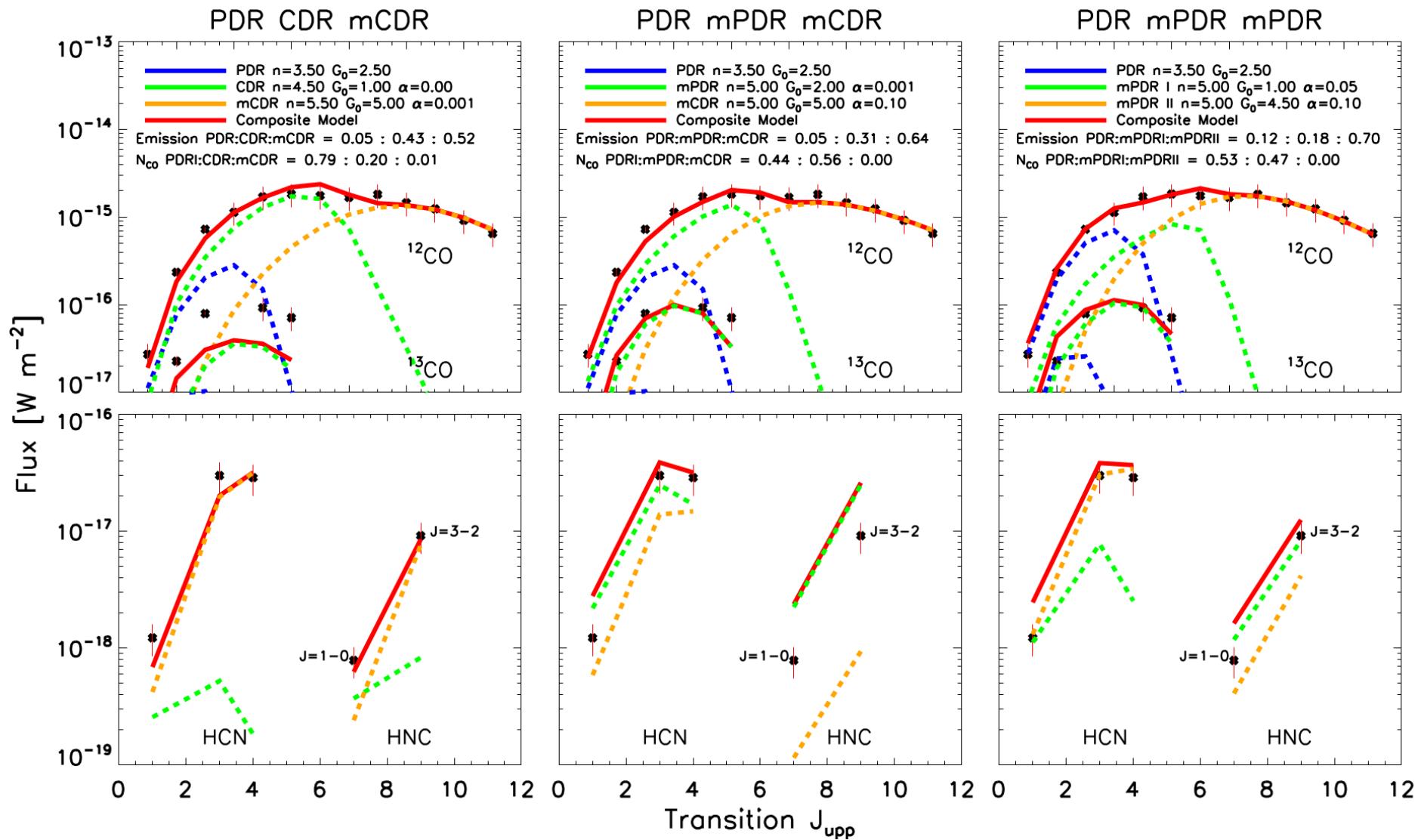
[CII] deficit revisited with SHINING

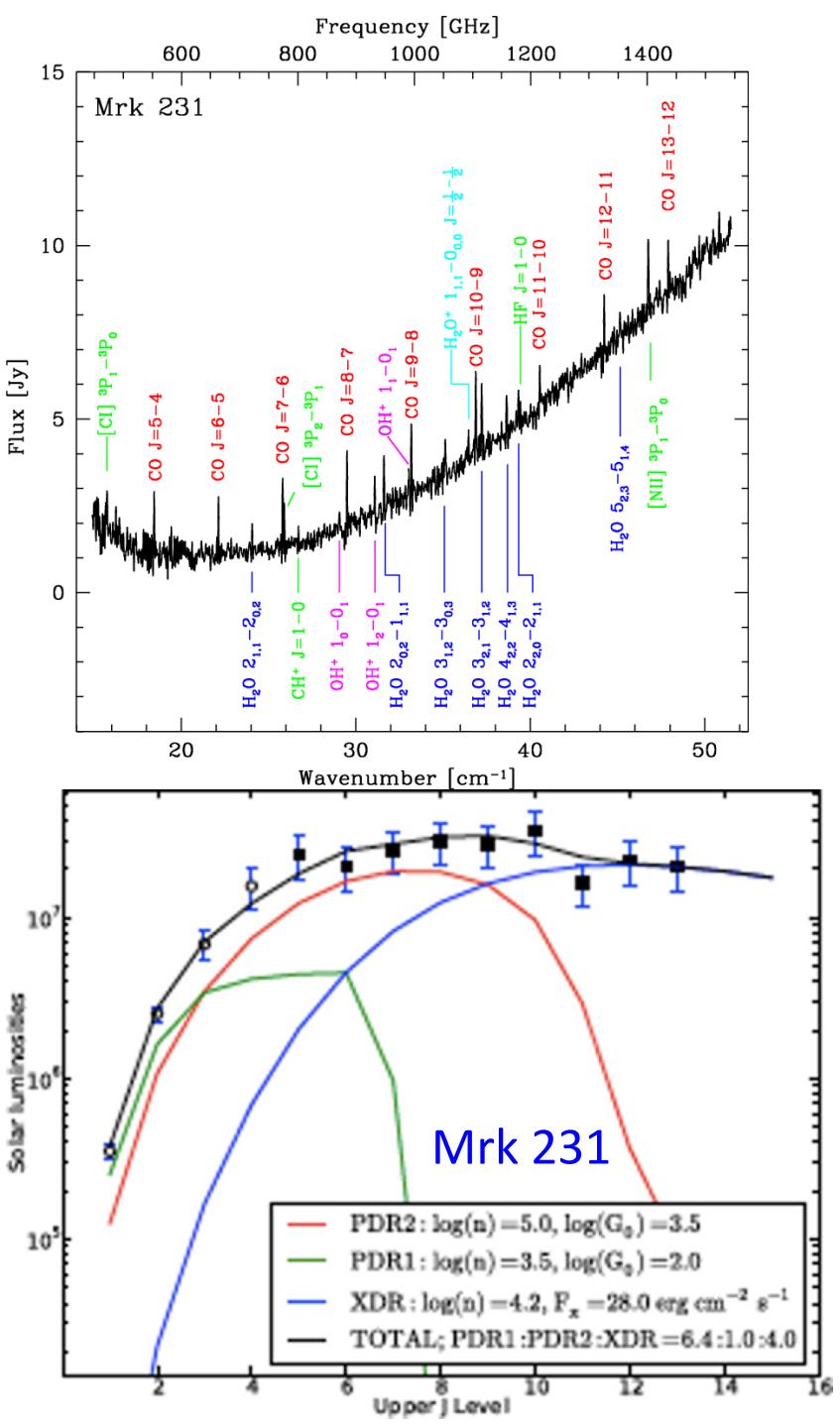


Deficit could be governed by SF efficiency, ionization parameter, optical depth? Work in progress, more galaxies will help.

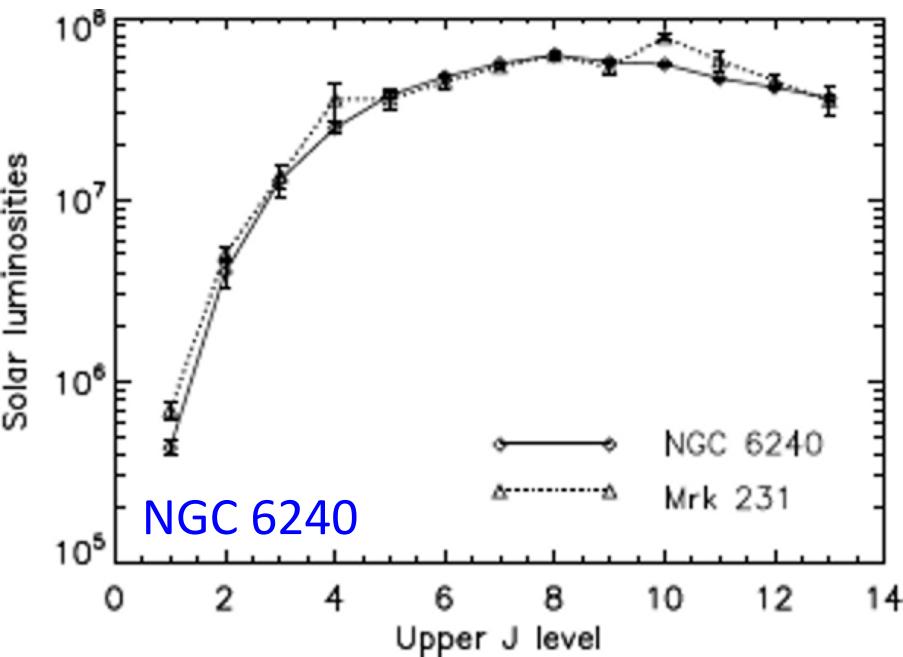
molecular ISM diagnostics

Cooling in NGC 253, need for mechanical heating



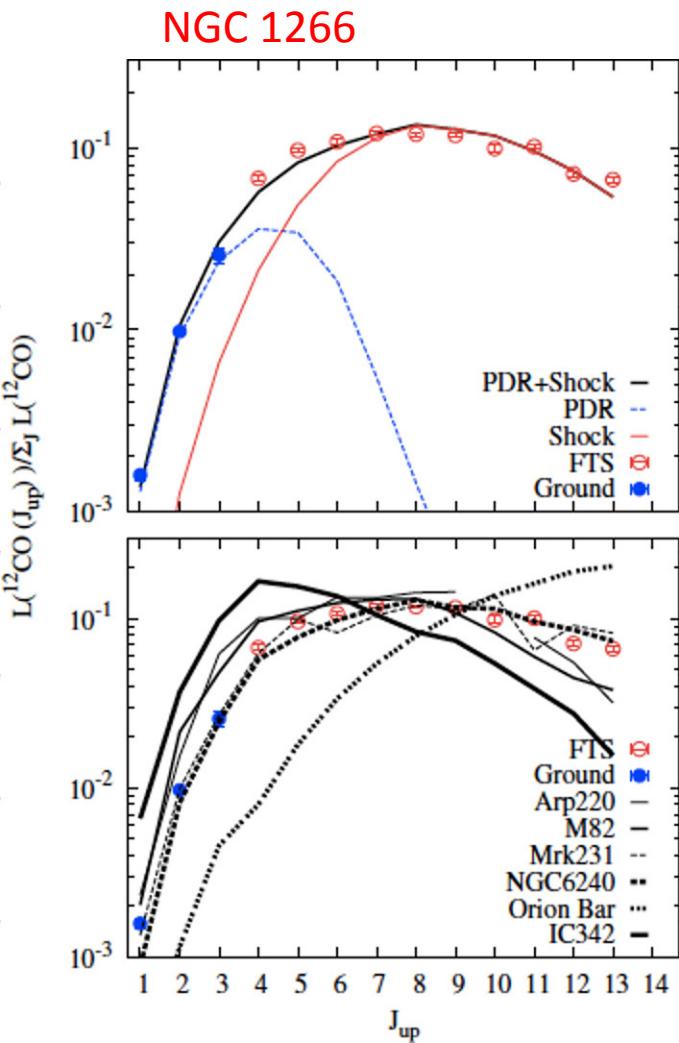


Local ULIRG cooling curves XDRs vs. shocks?

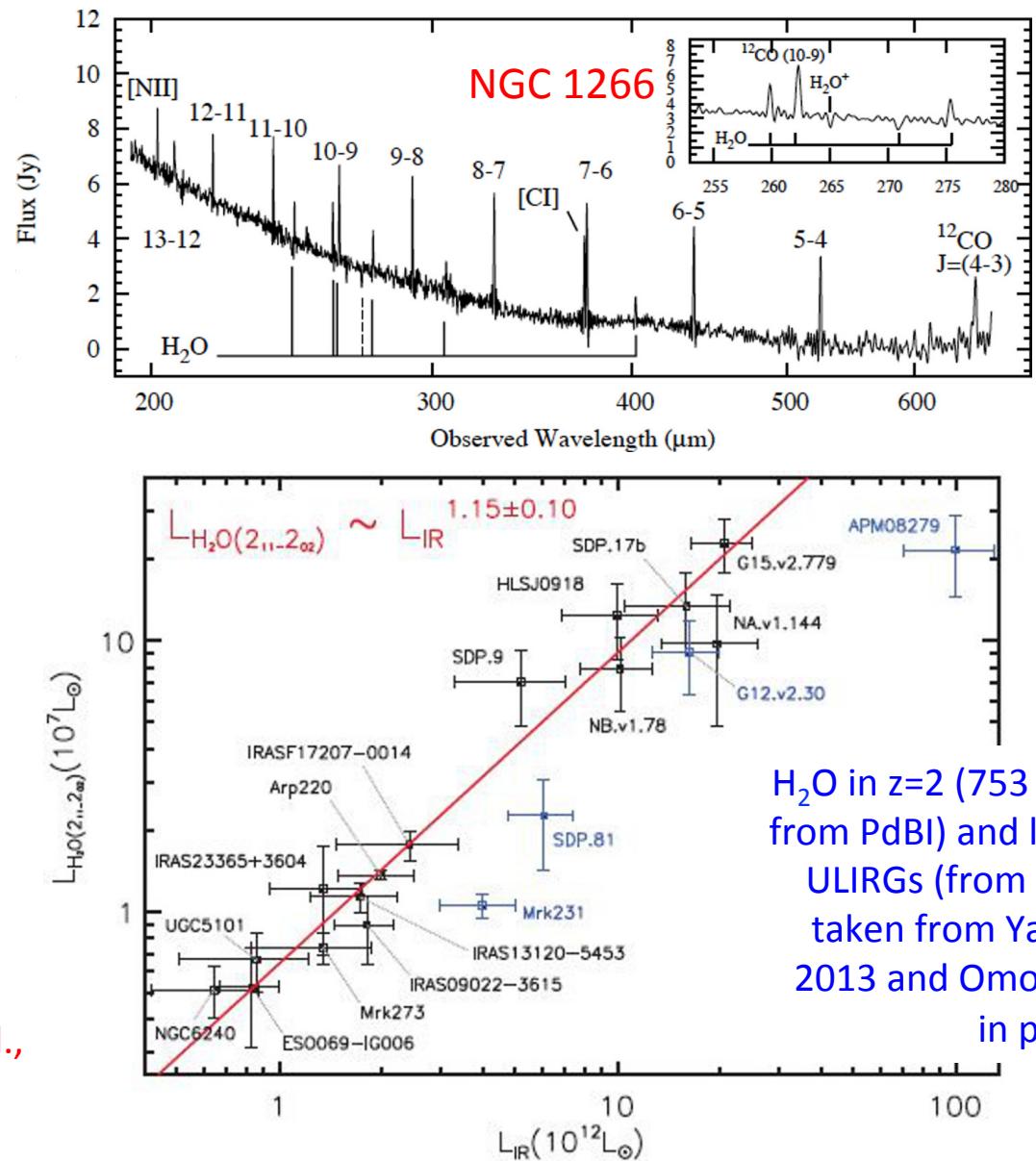


HerCULES, van der Werf et al., taken from
van der Werf+ (2010), Meierink+ (2013)

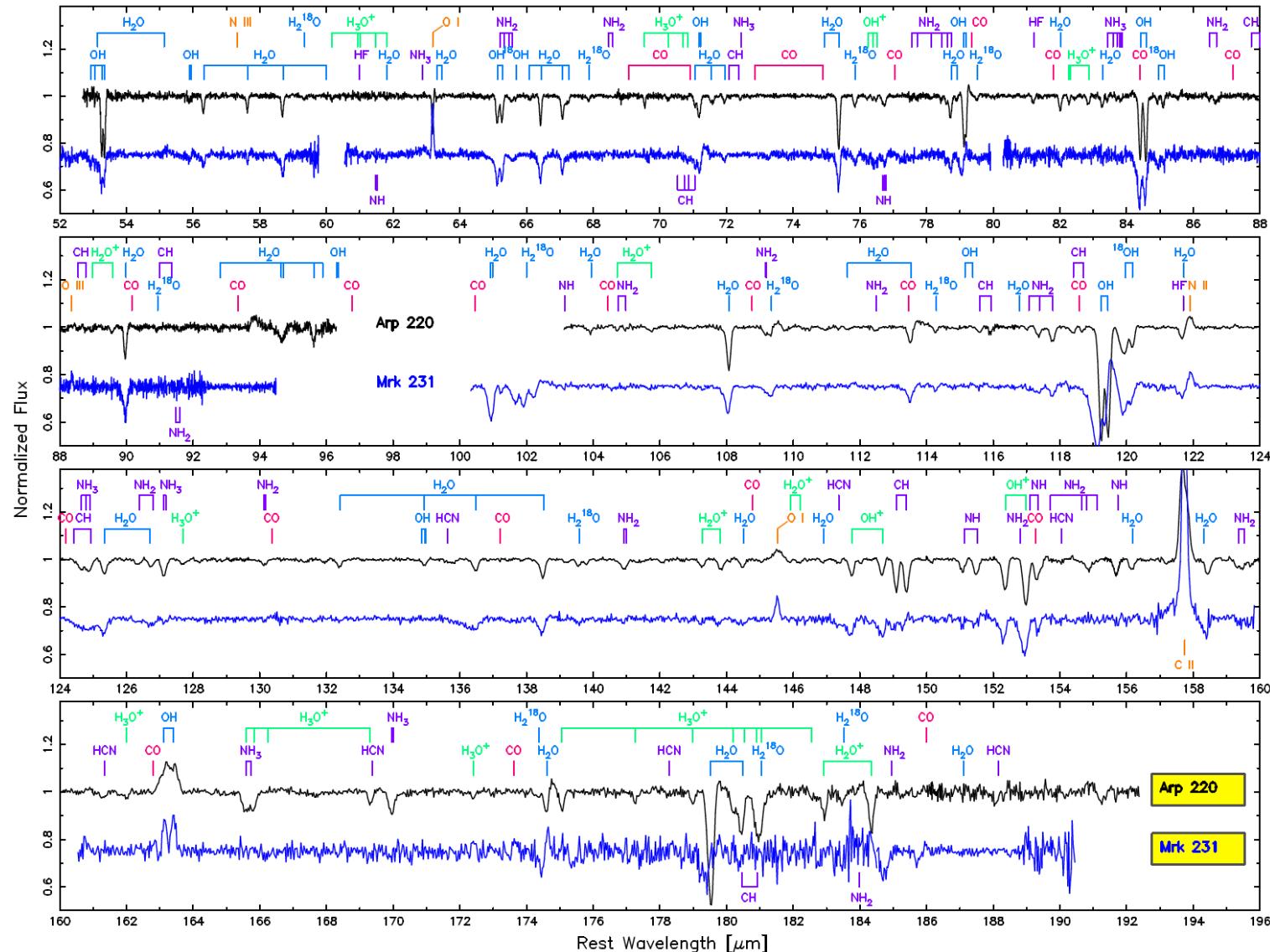
Water strongest molecule after CO in FTS spectra



Shocks in NGC 1266 (FTP: JD Smith et al., taken from Pellegrini+ 2013)



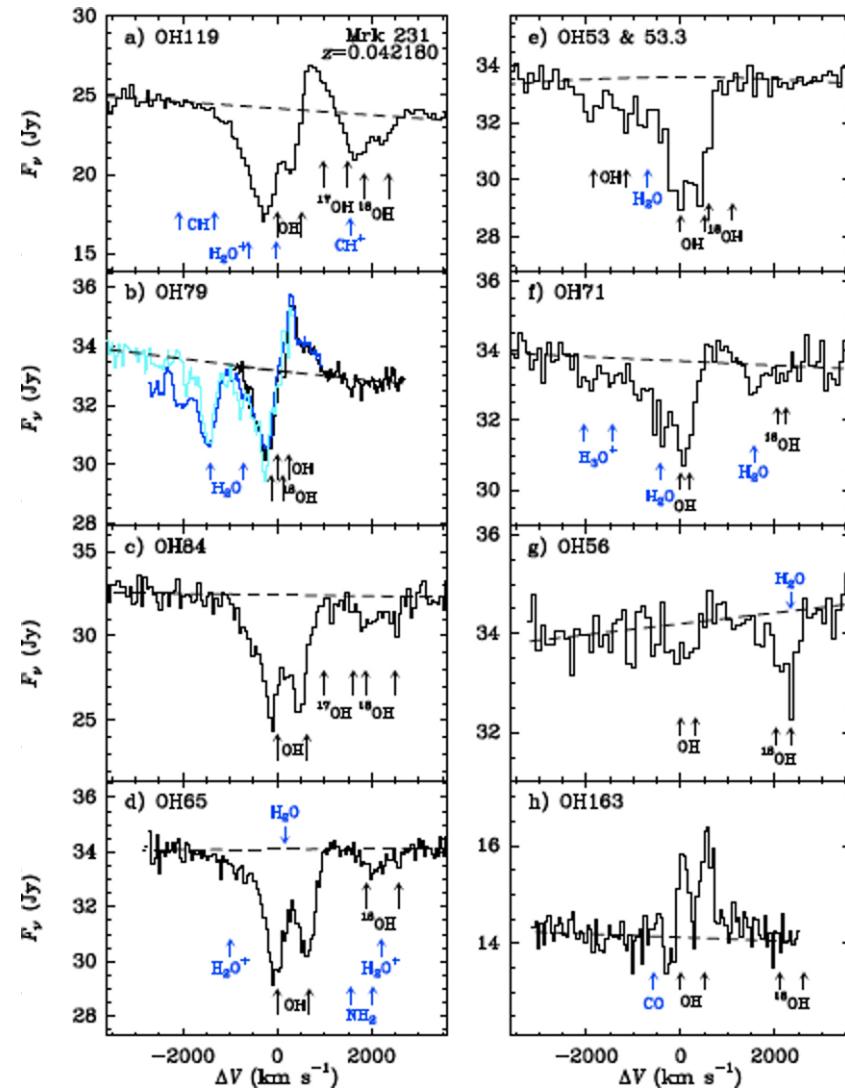
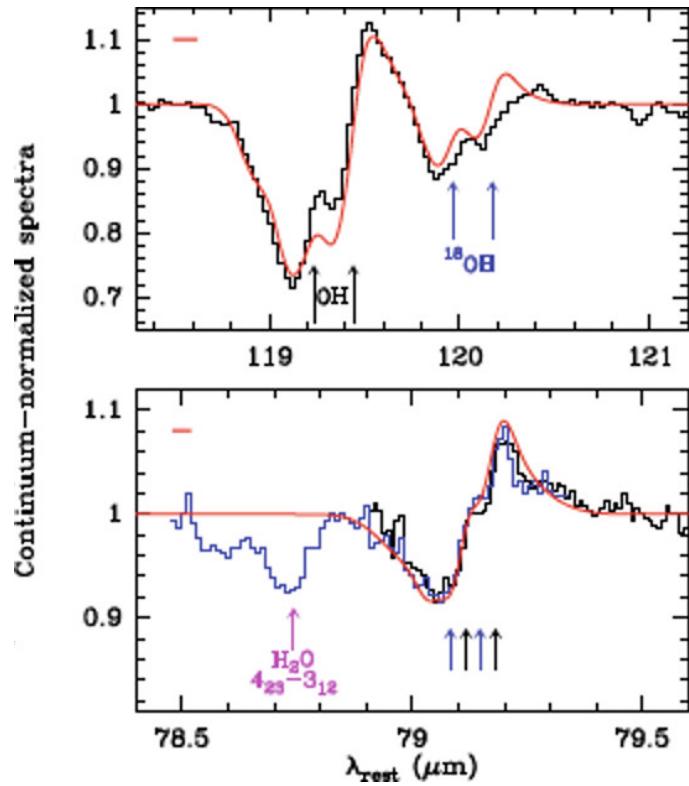
Arp 220, Mrk 231 – a “FIR, molecular photosphere”, $\tau(\text{FIR}) > 1$



Taken from Fischer+, in preparation

AGN feedback in local ULIRGs

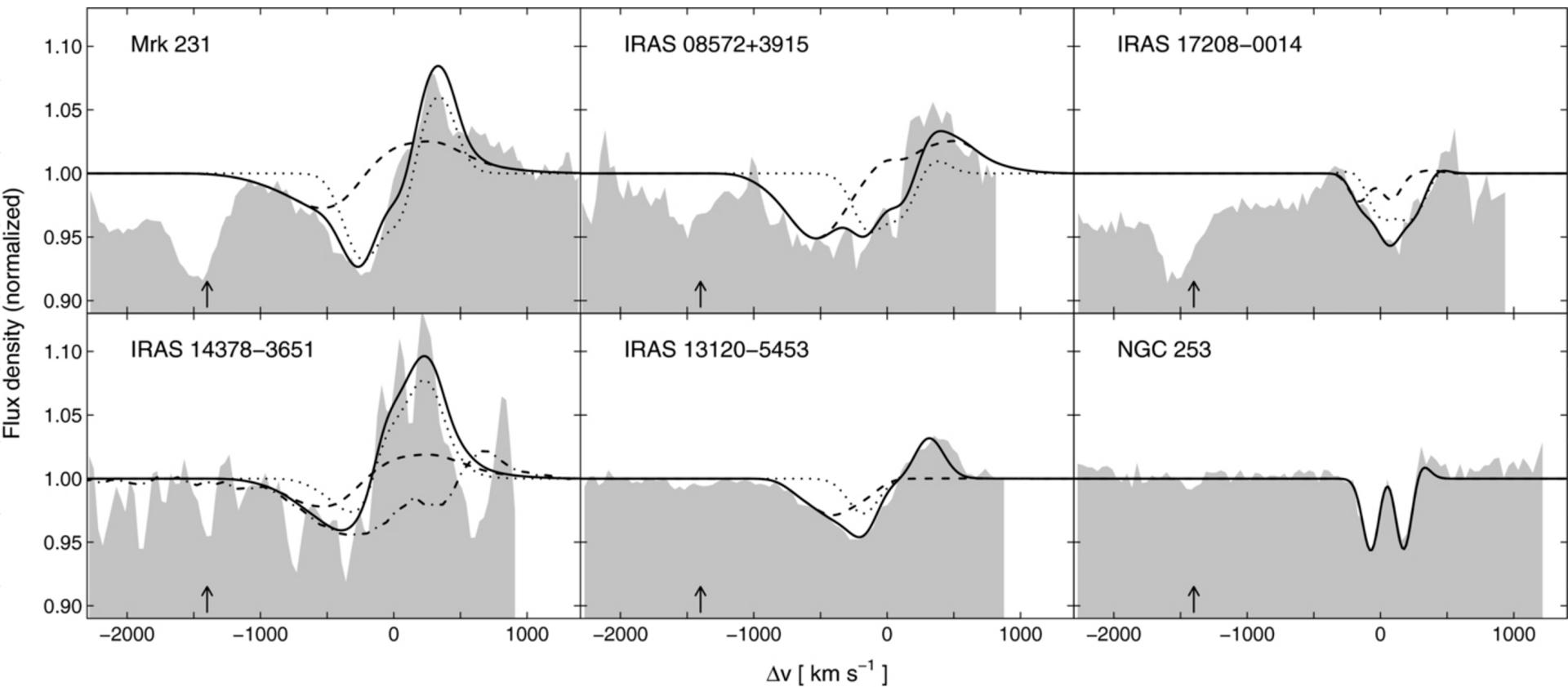
The molecular outflow in Mrk 231



(seen in various OH transitions)

From Fischer+ (2010) and Gonzalez-Alfonso+ (2013).

Massive molecular outflows in ULIRGs



OH profiles show in some cases outflow velocities of 1000 km/s.

SHINING, taken from Sturm+ (2011). Continued in Veilleux+ (2013),...

... the end of the beginning ...

Herschel has surpassed expectations and opened pathways to synergies with other facilities (e.g., ALMA, SOFIA, JWST, EVLA, ...)

Herschel's treasury is safeguarded by the *Herschel* Science Archive and will be a valuable resource for years to come.

Thanks to all those whose hard work and dedication made Herschel the success it turned out to be!

