

First Bites of the KINGFISH*

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and the KINGFISH Team

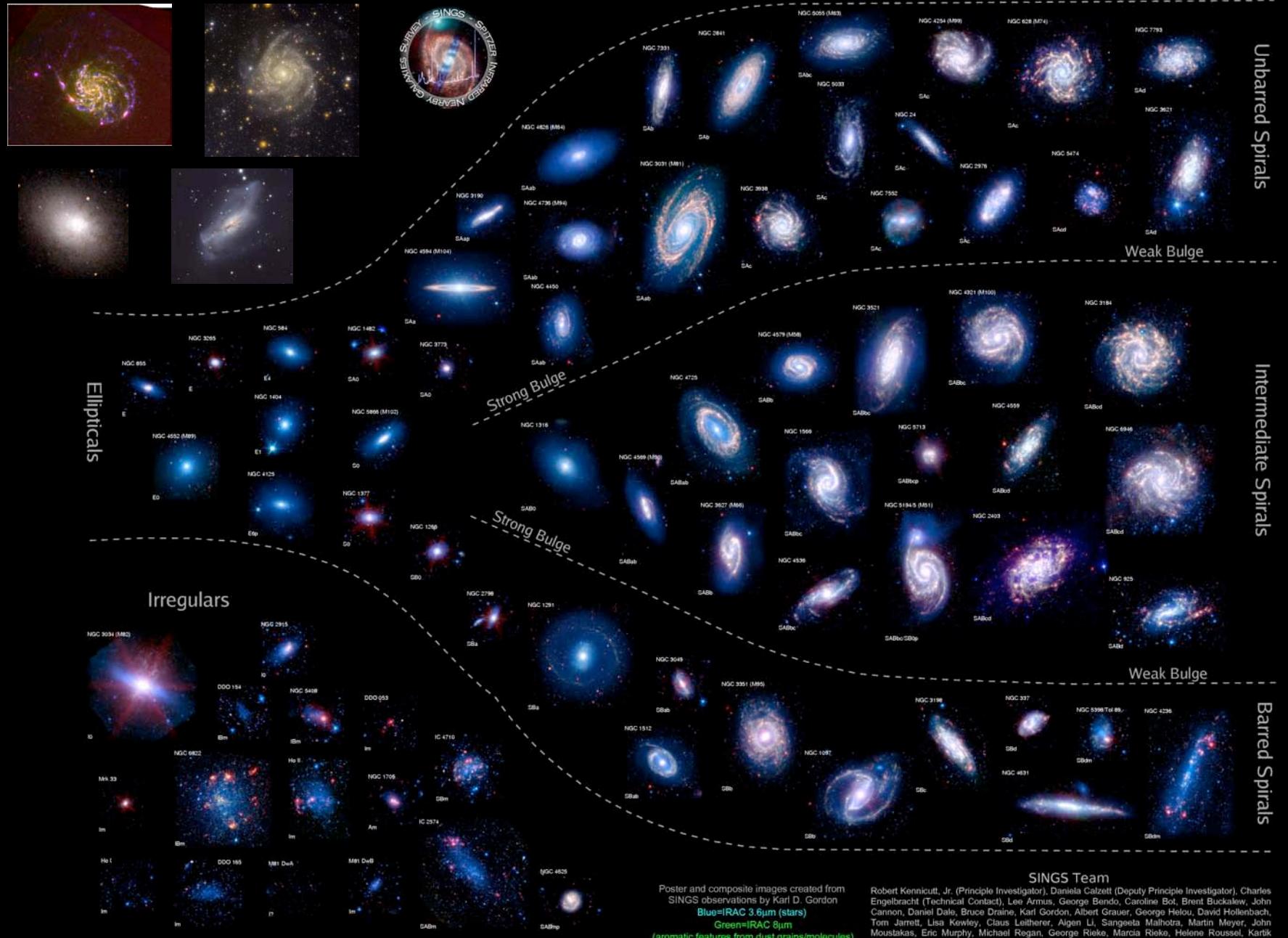


PRELIMINARY!



*Key Insights on Nearby Galaxies: A Far-Infrared Survey with Herschel

The Spitzer Infrared Nearby Galaxies Survey (SINGS) Hubble Tuning-Fork

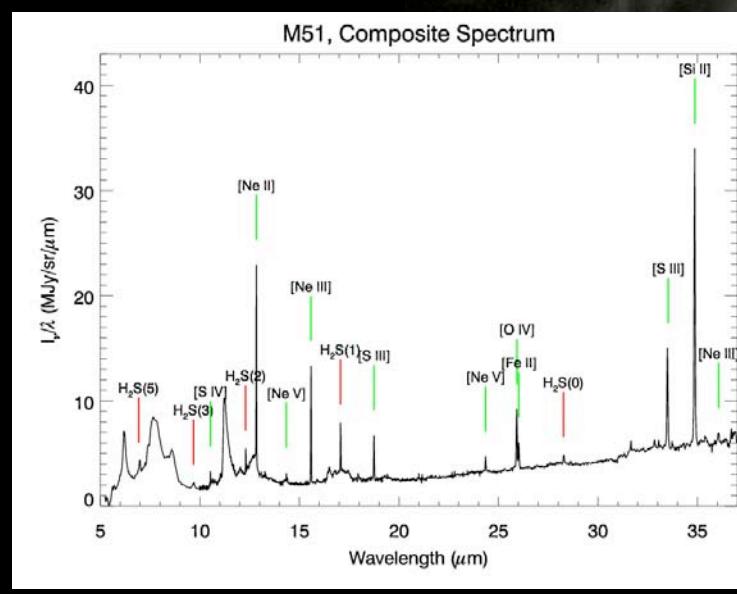


KINGFISH Summary

- Multi-wavelength observations of 61 galaxies
 - from SINGS + M101, IC 342, NGC 3077, NGC 2146)
- Complete, deep PACS/SPIRE imaging
 - 70, 110, 160, 250, 350, 500 μm
- PACS line imaging (centres, strips, HII regions)
 - [CII]158, [OI]63, [OIII]88, [NII]122, 205 μm
- SINGS/Spitzer ancillary data (*radio to X-ray*)
- Core science goals
 - spatially resolved SED maps → star formation, dust physics
 - deep extended submillimetre maps → cold dust in galaxies
 - cooling lines → physics of atomic/molecular environments

NGC 6946

PACS spectroscopic pointings

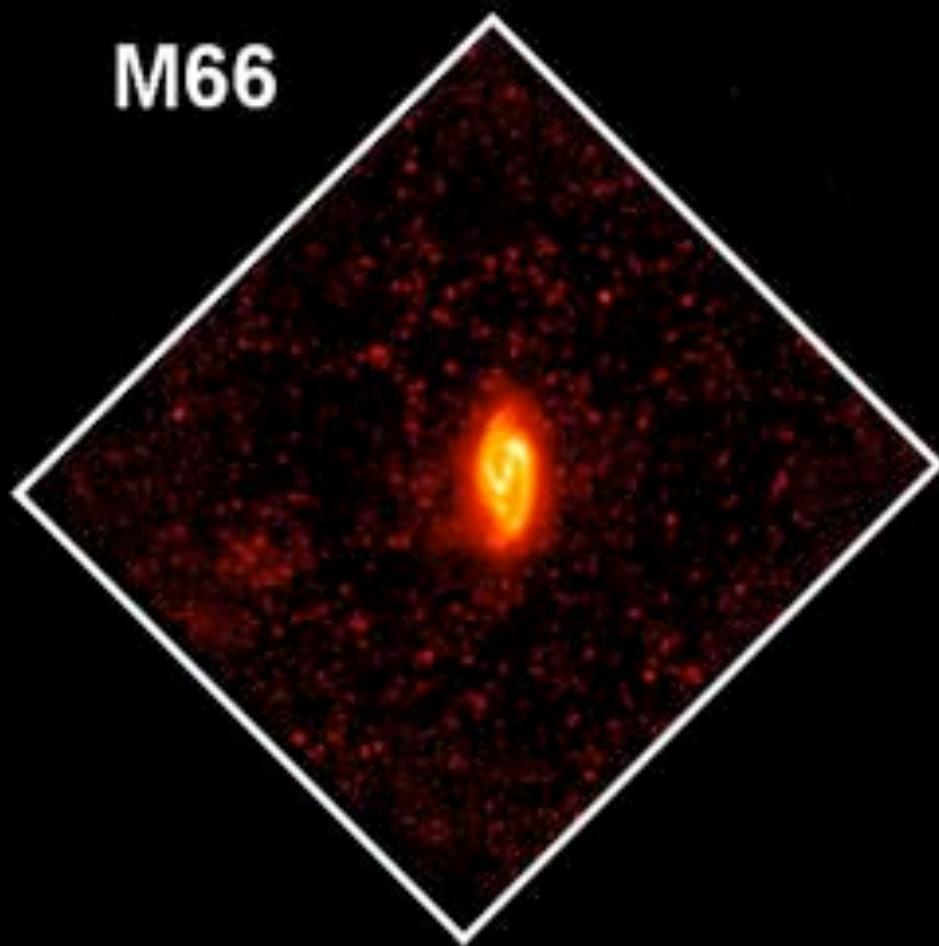


KINGFISH Summary

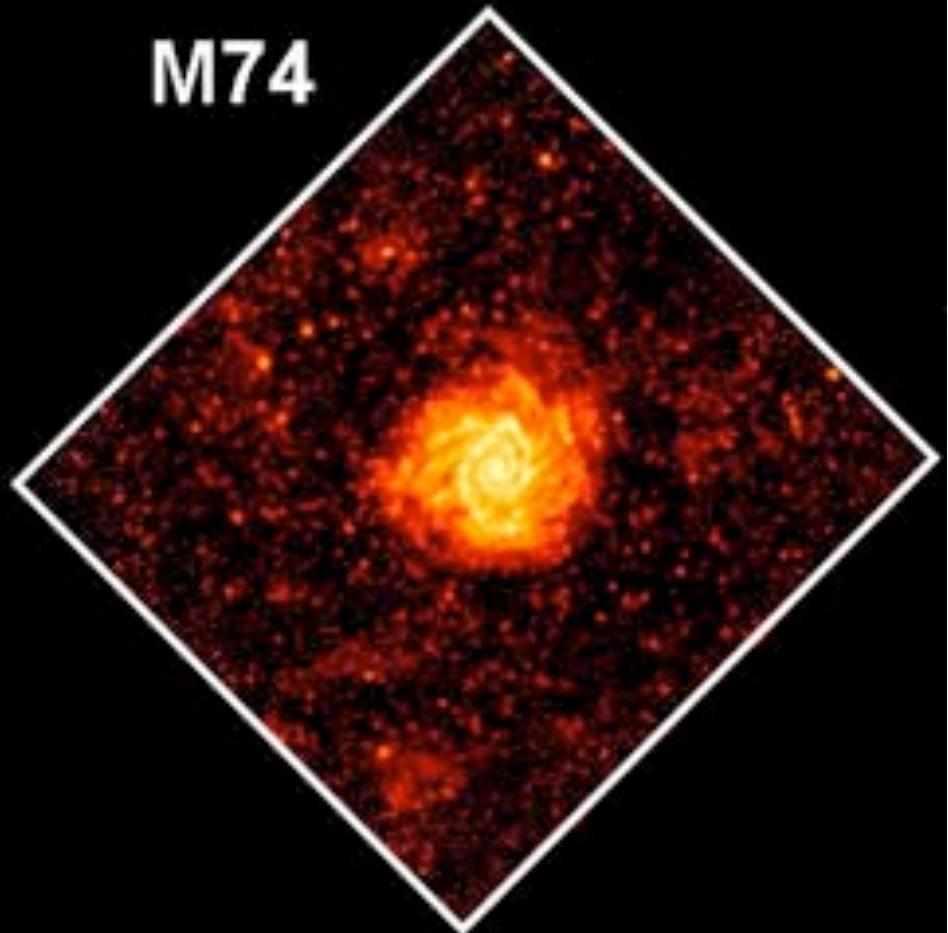
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Herschel/SPIRE 250 μ m Images

M66



M74



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KINGFISH SDP Targets

NGC 1097



NGC 4559



Three Views of NGC 4559

SDSS
gri

GALEX
0.15/0.23 μm

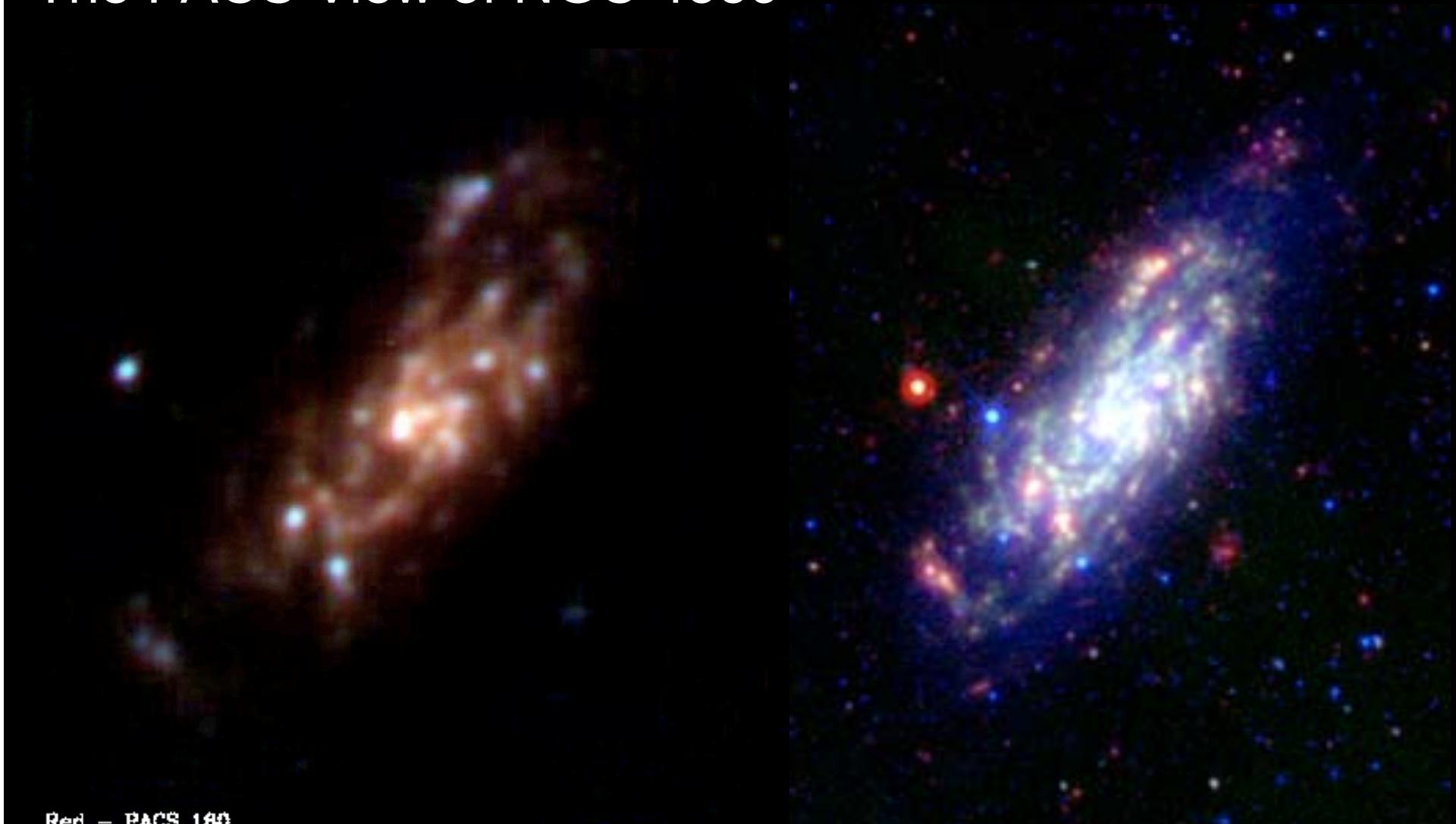
Spitzer
3.6/8/24 μm



Scd
 $M_B = -20.5$

dist = 11.6 Mpc
 $L_{\text{IR}}/L_{\text{opt}} = 0.2$

The PACS View of NGC 4559

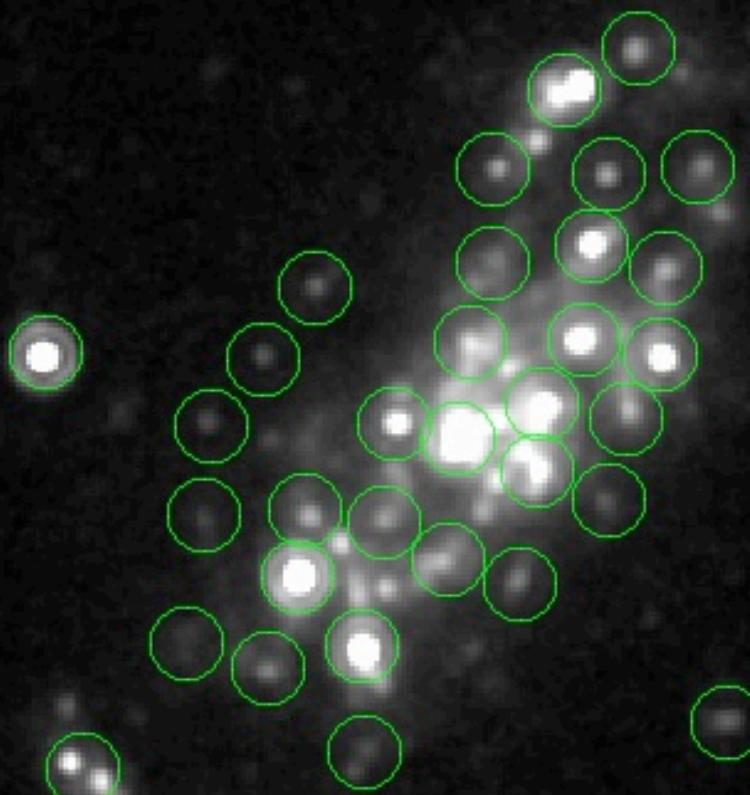


Red – PACS 180
Green – PACS 100
Blue – PACS 70

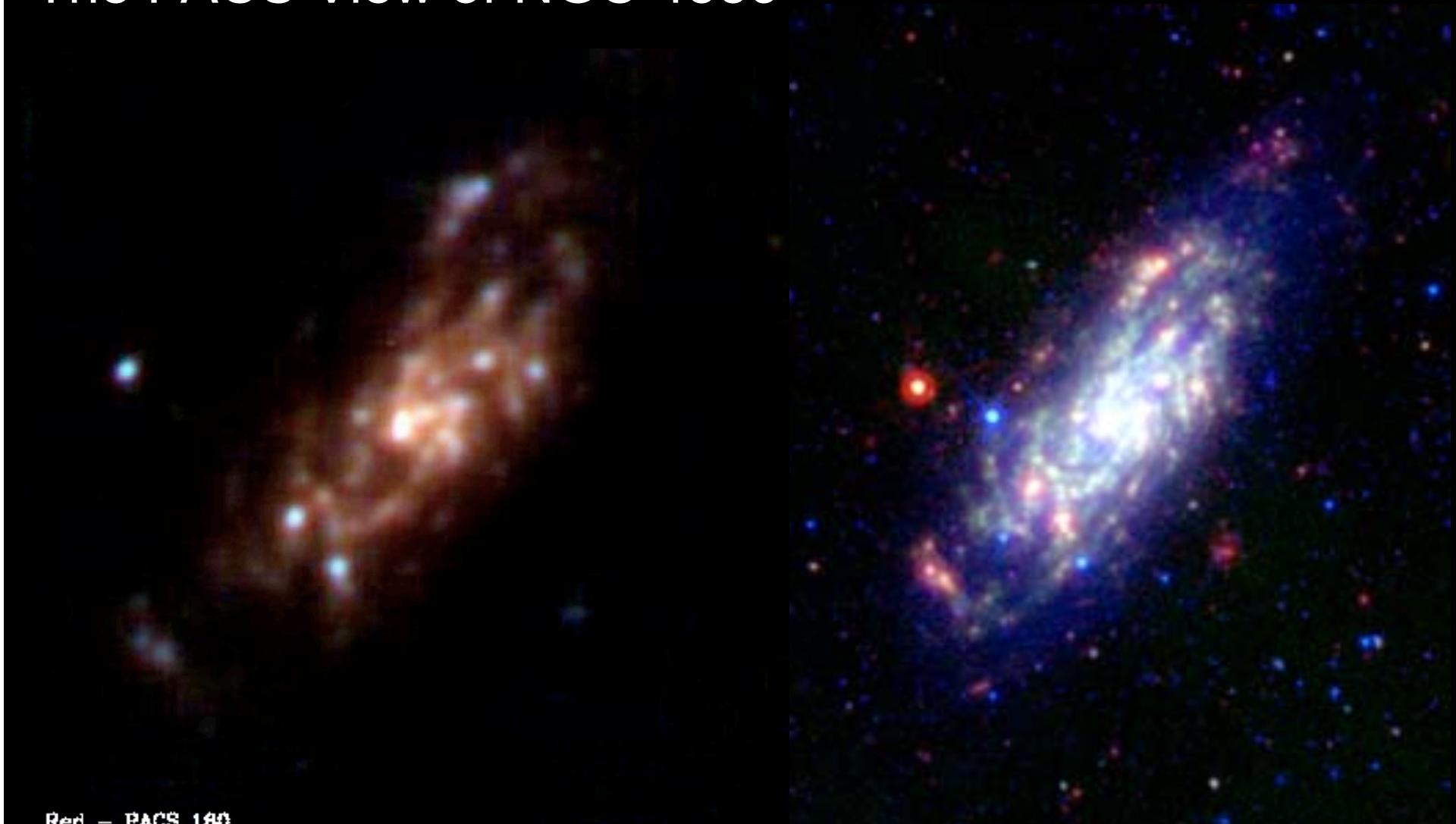
Spitzer 3.6, 8.0, 24 μm

NGC 4559

PACS 70 μm



The PACS View of NGC 4559

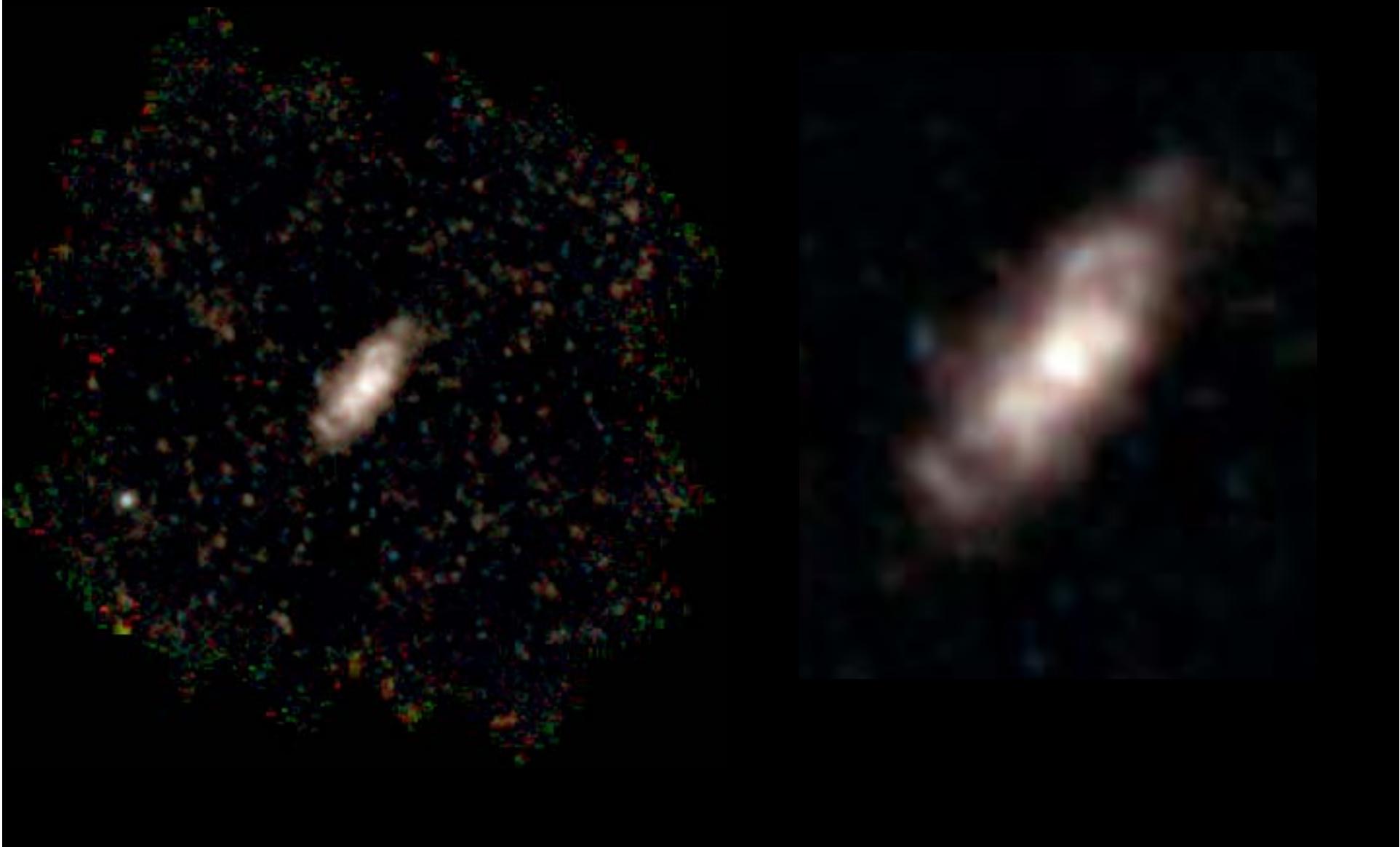


Red – PACS 180
Green – PACS 100
Blue – PACS 70

Spitzer 3.6, 8.0, 24 μm

The SPIRE View of NGC 4559

250, 350, 500 μm

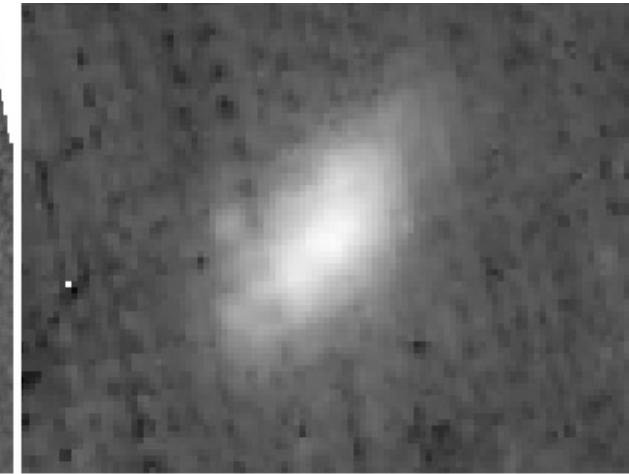
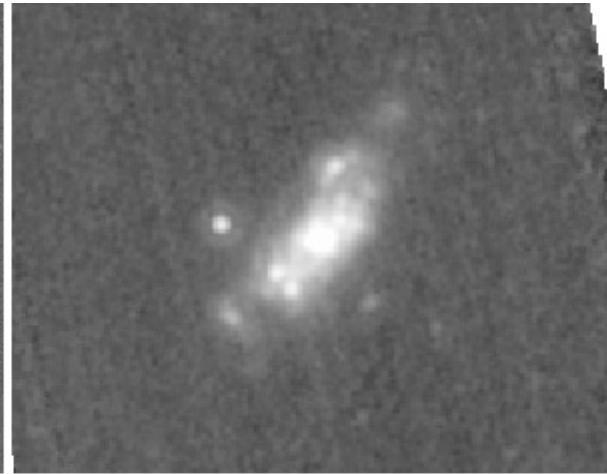
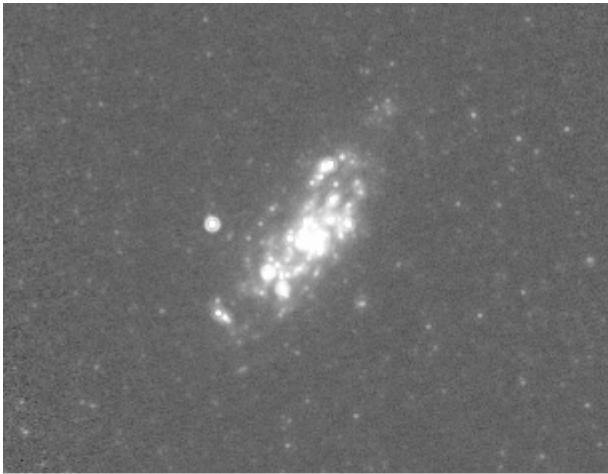


MIPS

24 μm

70 μm

160 μm

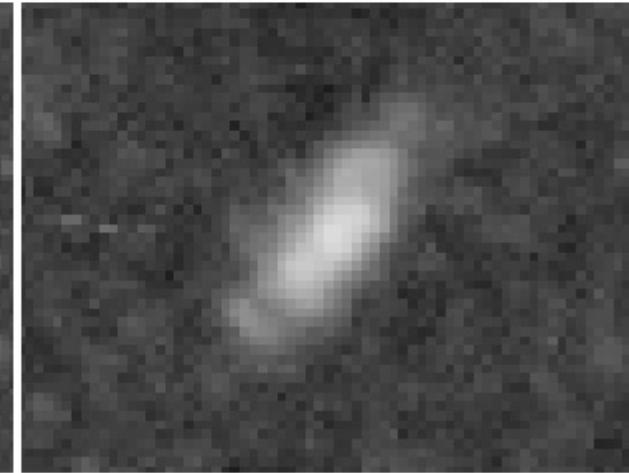
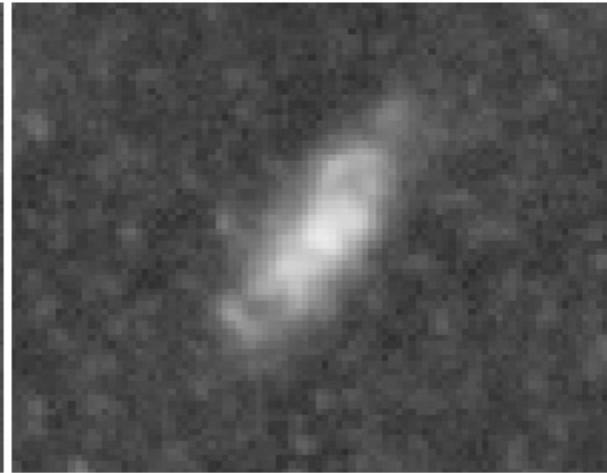
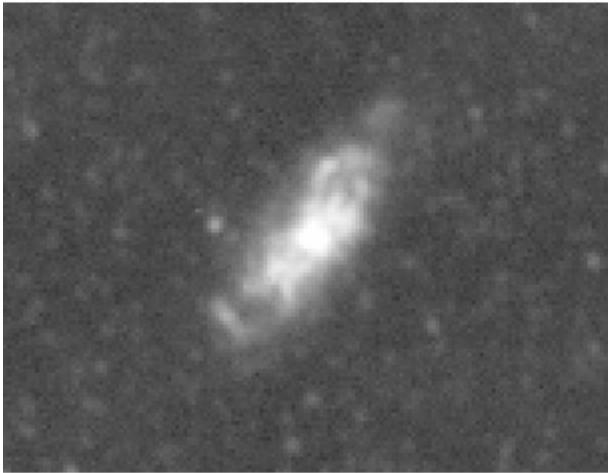


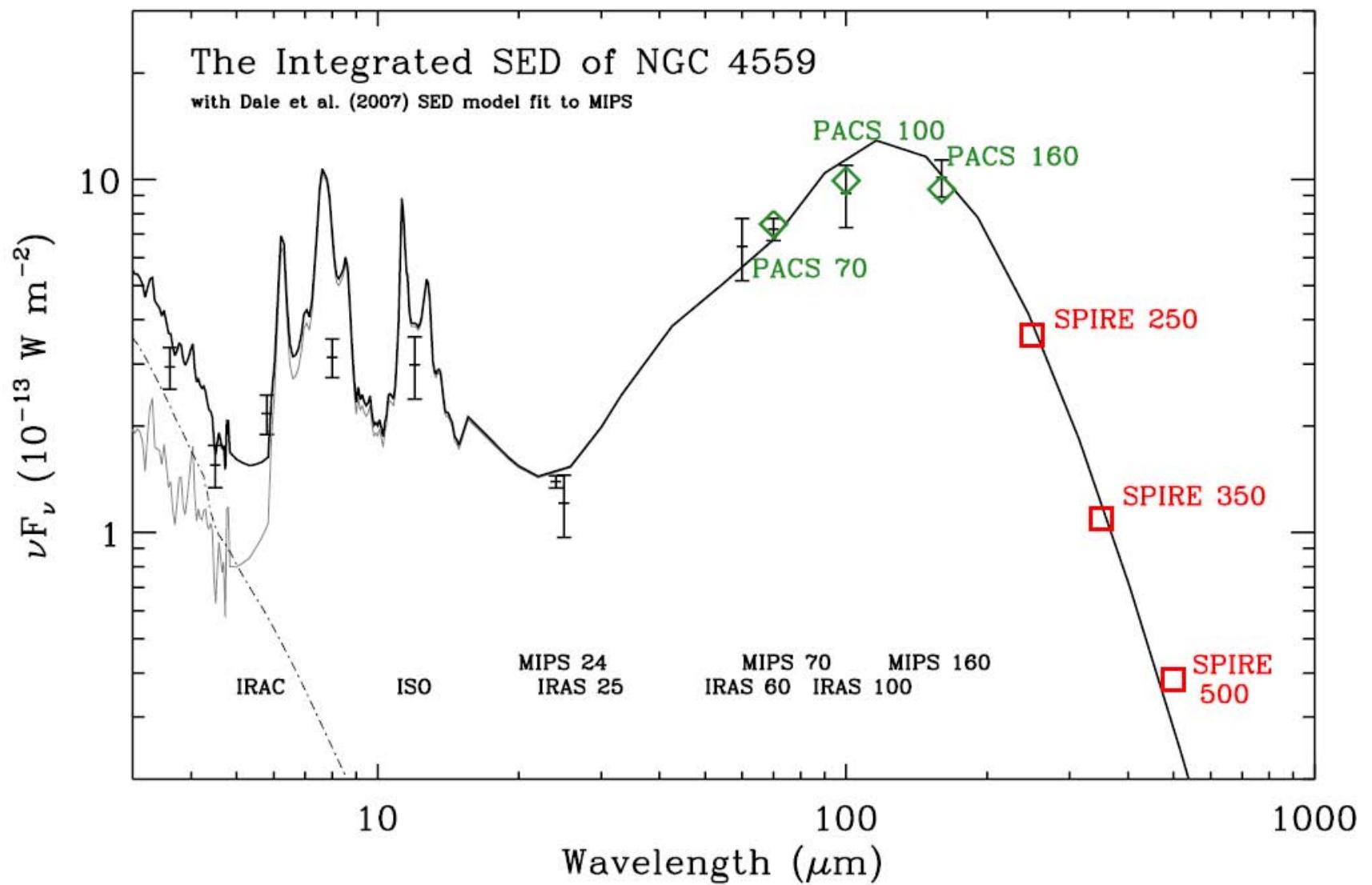
SPIRE

250 μm

350 μm

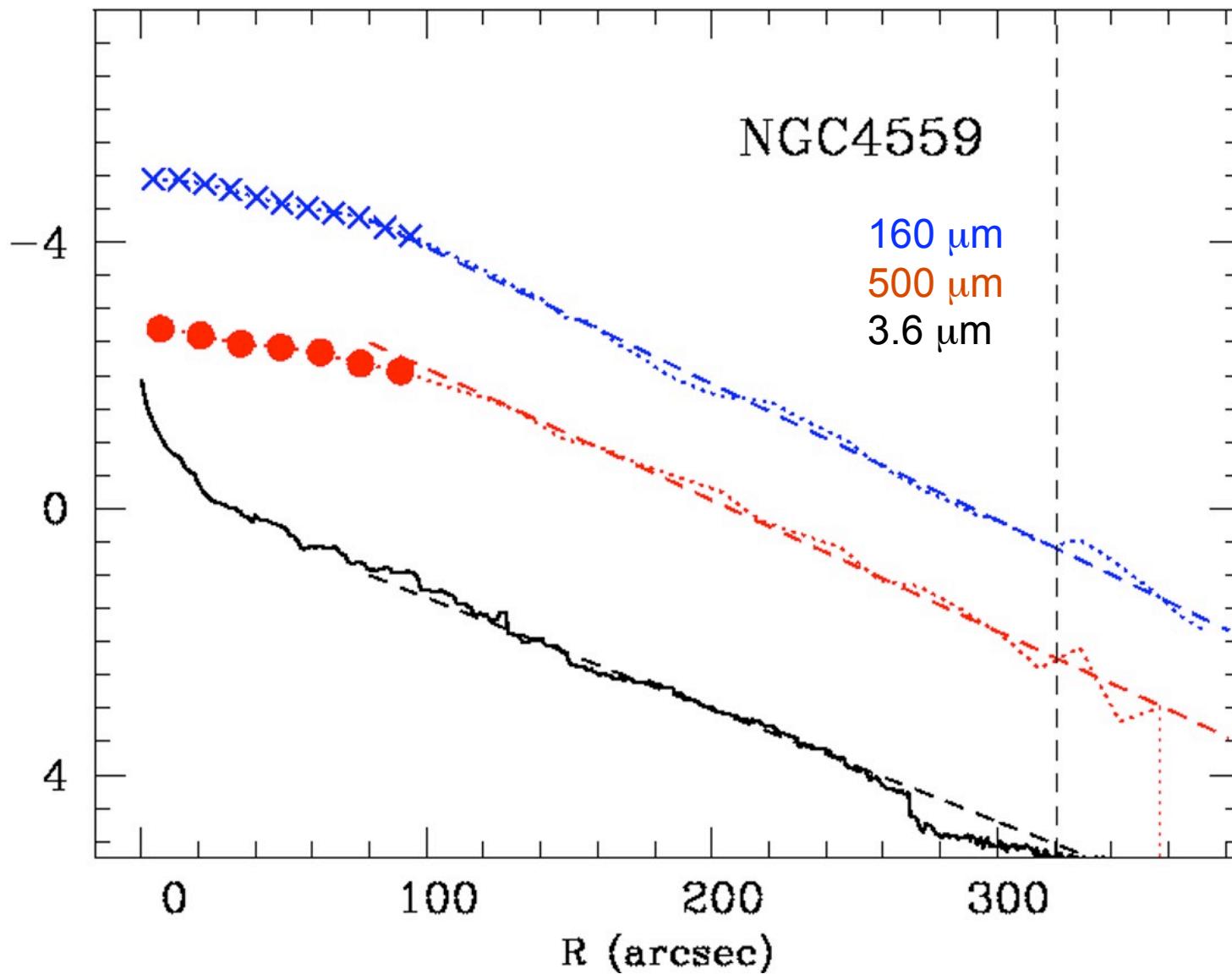
500 μm



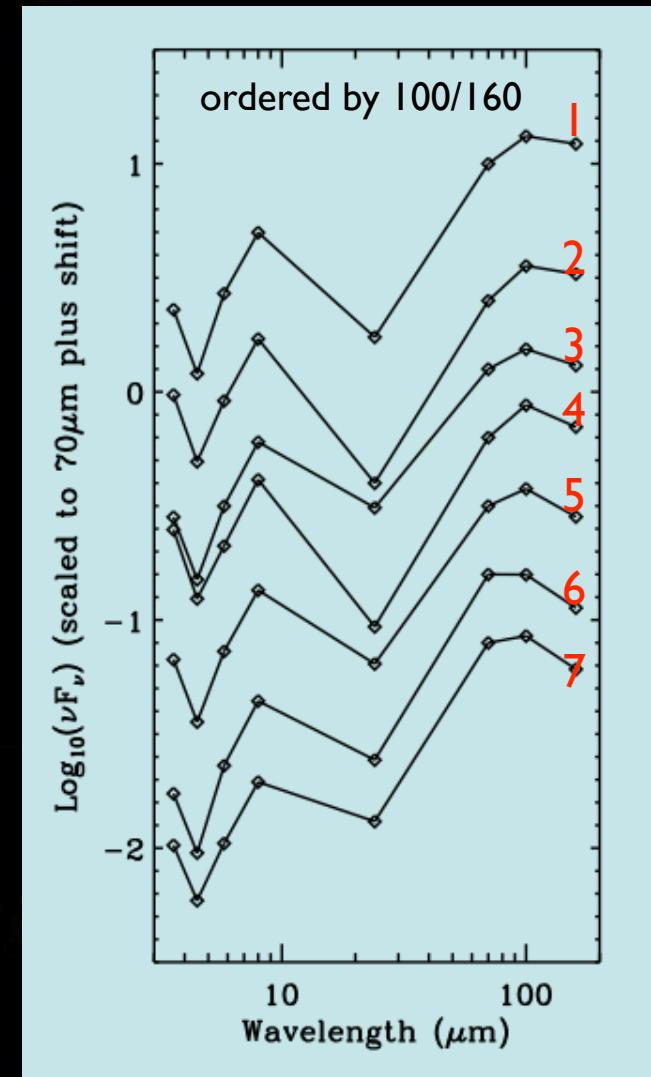
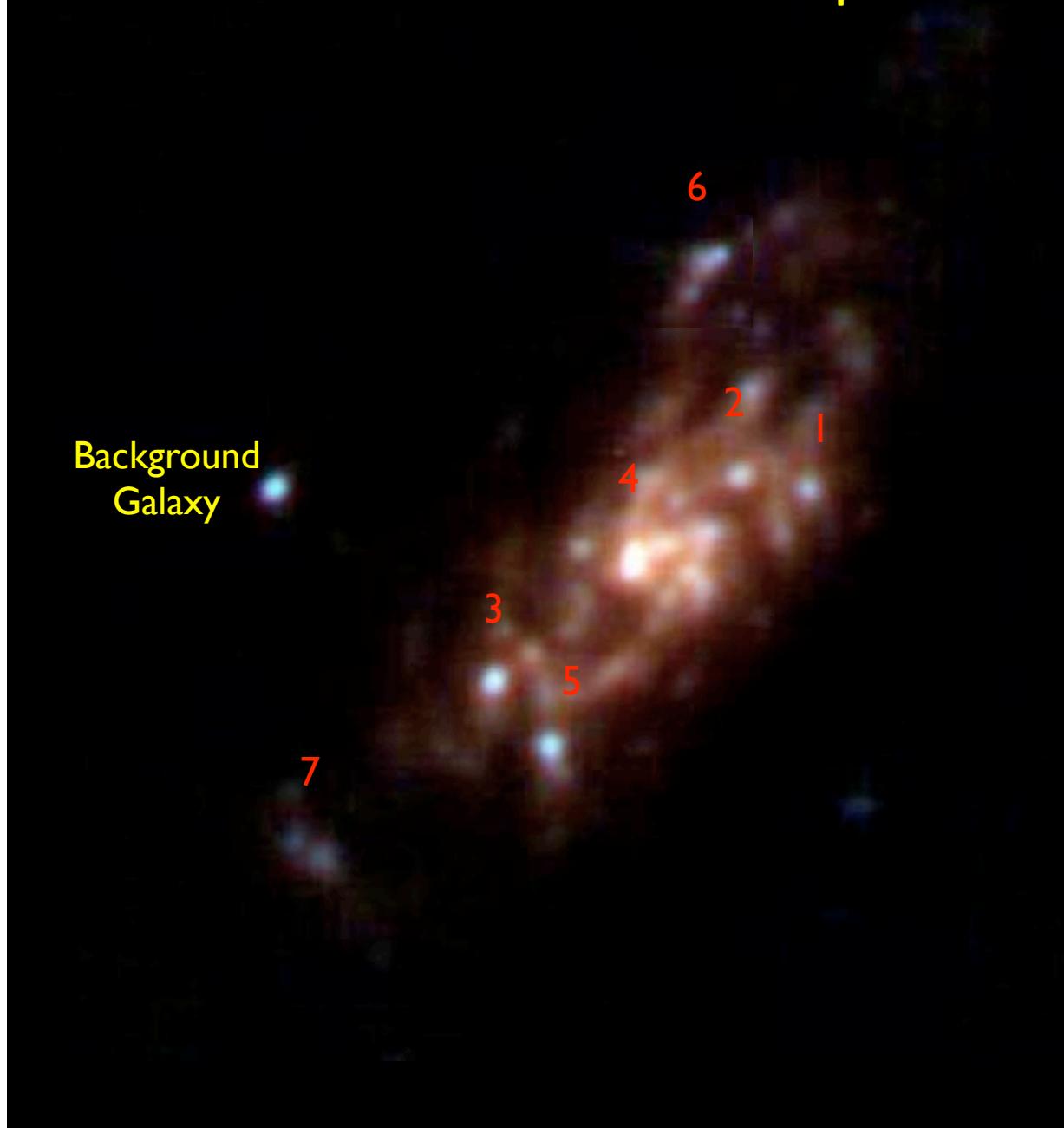


Radial profiles

SPIRE + MIPS + IRAC [2.5Log(MJy sr⁻¹)]

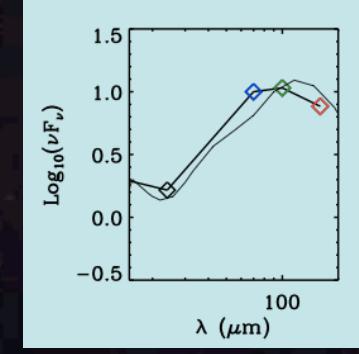
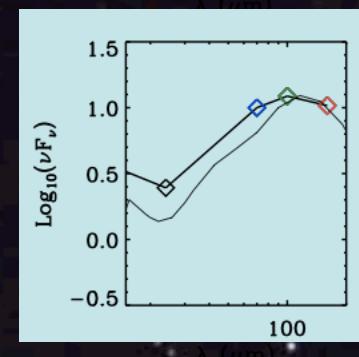
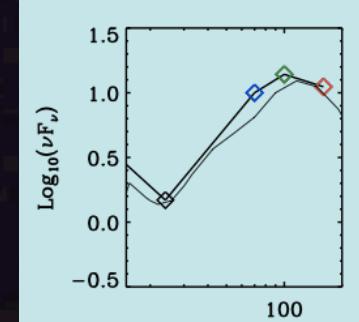
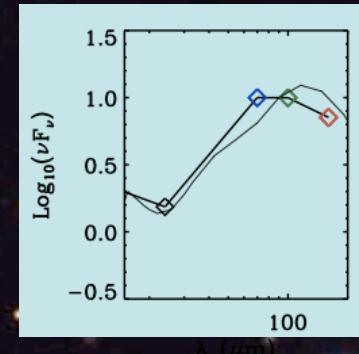


Individual H II Complexes at 160 μm

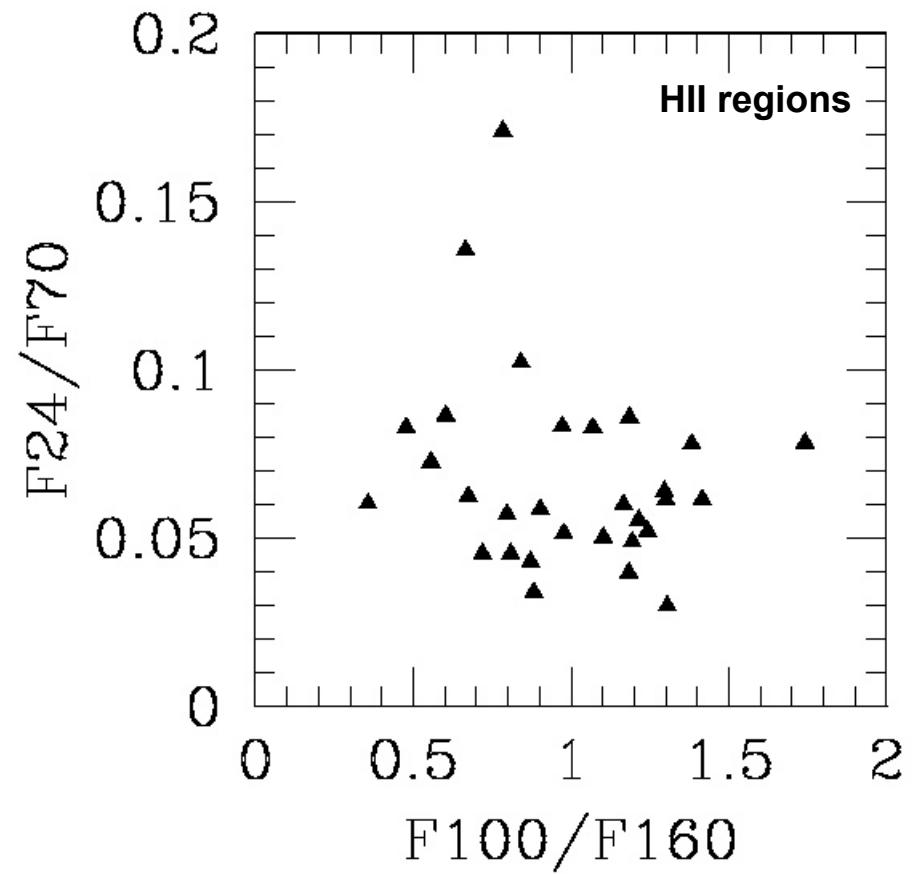
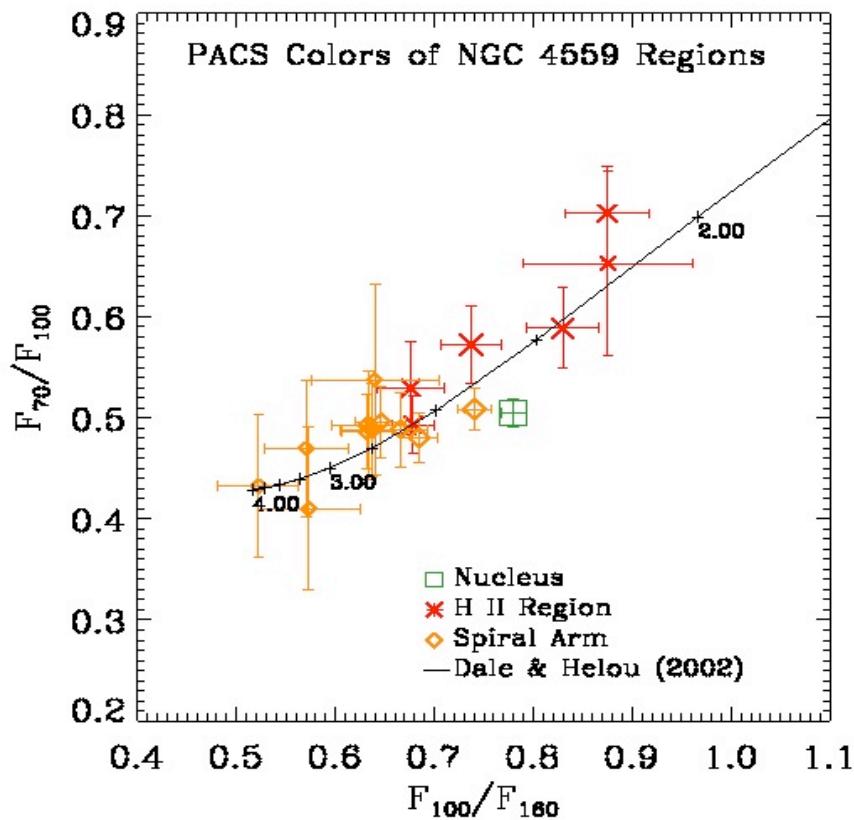


SEDs of Individual H II Regions overlaid with normalized D07 Model for NGC 4559

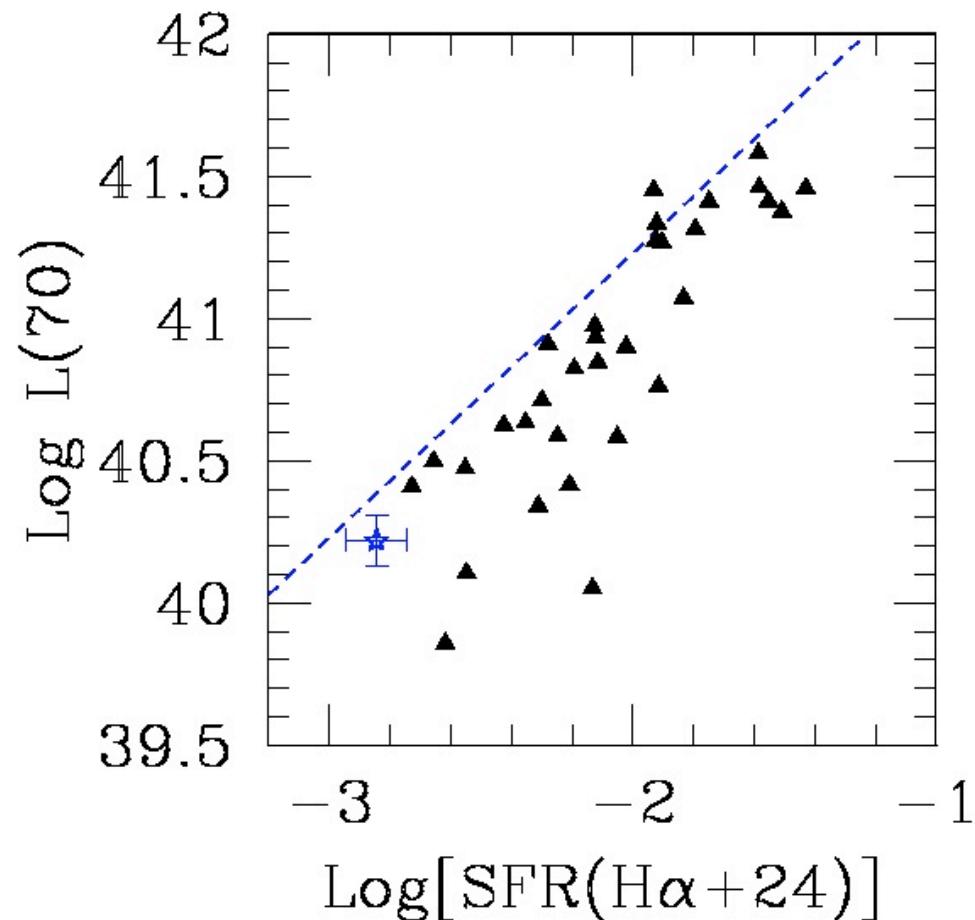
Optical PACS



PACS and PACS/MIPS color–color relations



- young SF regions have suppressed far-IR emission relative to entire galaxies
- consistent with substantial IR emission contribution from diffuse dust (and low dust attenuation in HII regions)



NGC 4559: MAPPING EXCITATION IN DISKS WITH PACS

First Spectra obtained in Chop-Nod Strip

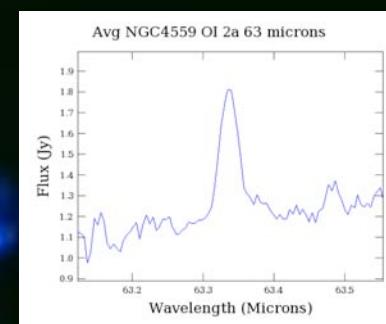
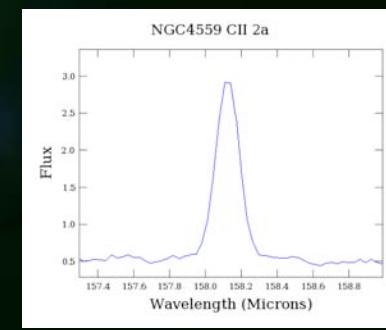
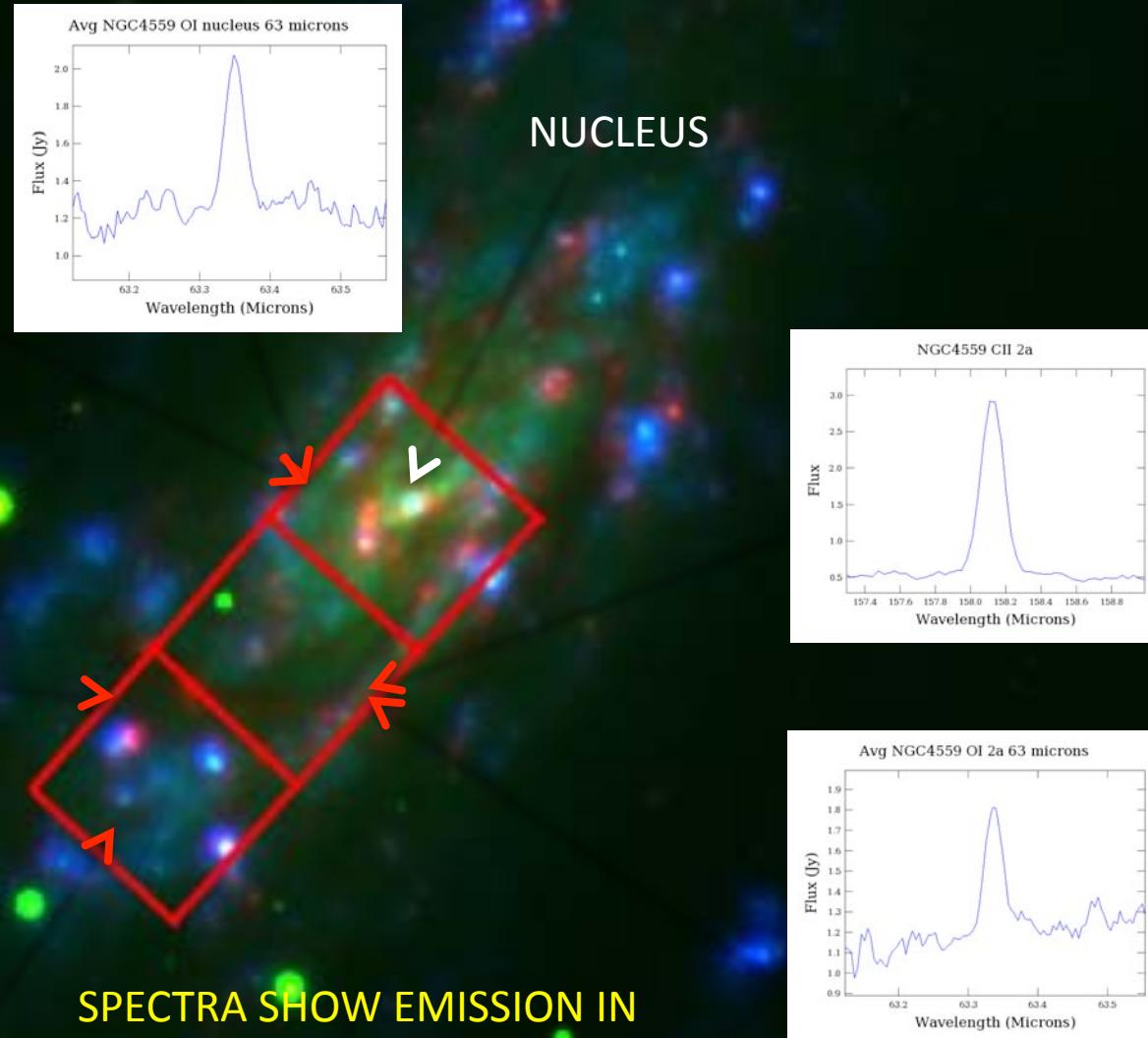
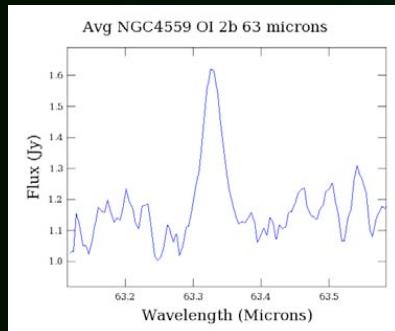
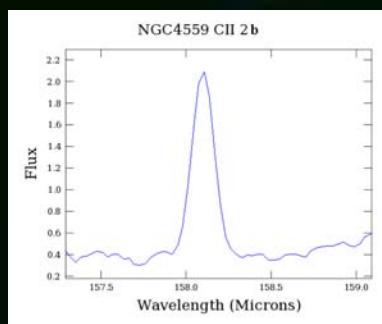
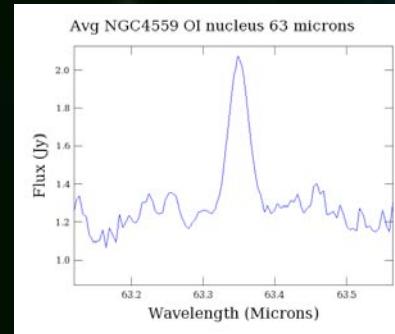
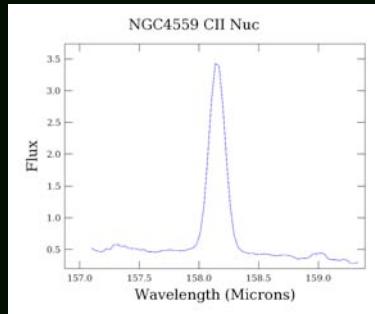
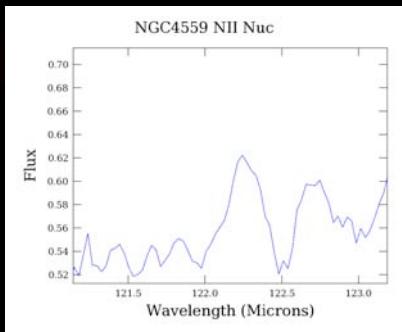


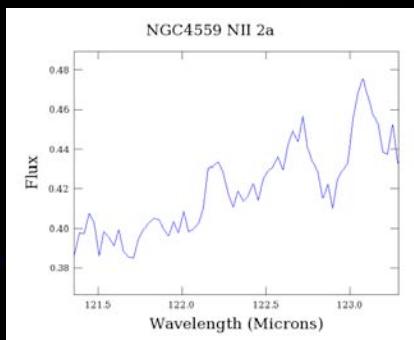
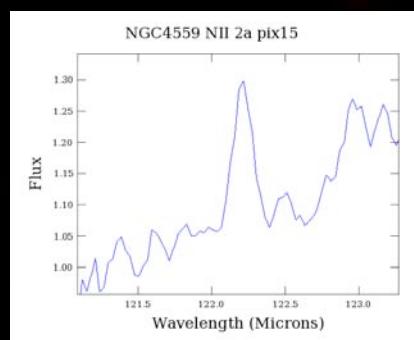
IMAGE: GALEX FUV/B/IRAC 8 μ m

IMAGE 24 micron Spitzer
70 micron PACS
250 micron SPIRE

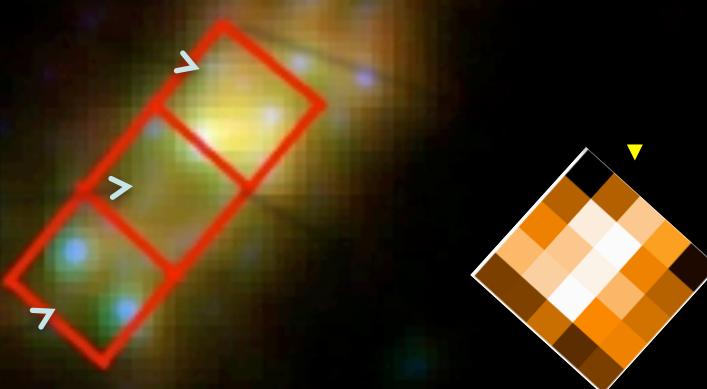
Strong variations in [CII], [OI], [NII]



[NII] 121 μ m, 3 positions



map in [CII]157.7 μ m



**CARBON
FOOTPRINT
!**

*CHOP-NOD OBSERVATIONS PROVIDE GLIMPSE OF THE HUGE
POTENTIAL OF THE KINGFISH PROJECT*

Lessons Learned from SDP (so far)

- PACS, SPIRE imaging (scan mapping) meets proposed performance objectives
 - dust emission seen over wide range of spatial scales, with systematic variations in SEDs, temperatures
 - removal of low-frequency noise challenging, critical for interpretation of low surface brightness emission
- PACS line imaging achieves S/N targets for interstellar cooling lines
 - again, ratios show large local variations
 - efficacy of wavelength-switching for this application remains to be tested (coming soon!)

The KINGFISH Team

*with special thanks to...

UK: Rob Kennicutt (PI), Paul Alexander, Dave Green, Ben Johnson, John Richer

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Italy: Leslie Hunt

Netherlands: Bernhard Brandl, Brent Groves

Spain: Amando Gil de Paz

China: Caina Hao

