Nearby Galaxies

Persistent Questions

- *What sets and regulates the IMF ? Is it universal ?*
  - *There are some variations among clusters, but it's extremely difficult to separate SF history from IMF. Are there significant variations on galactic scales ?*
  - *You don't measure the IMF directly. At high-z, you may be able to rule out significant departures from a standard (modified Salpeter) IMF.*
- *How does gas and dust cycle through, in and out of galaxies ?*
  - *How common are winds or gas infall for mature galaxies at z=0, then z=3, z=6 ?*
  - *Are bars critical for transport of gas to nuclei ?*
  - *Are we getting a better picture of "feedback" ? Multi-λ is critical for studying interplay of stars, hot/cold ISM.*
  - *How do the hot gas, warm gas, dust emission vary with position inside galaxies. Interplay of UV, shocks, obscuration.*

Nearby Galaxies

Persistent Questions

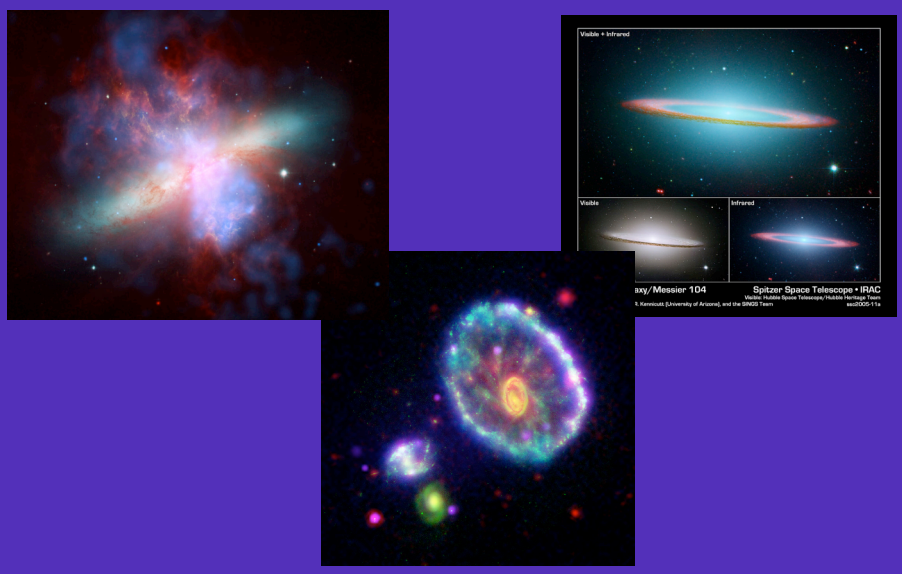
- *What are the details of the SB/AGN connection on sub-Kpc scales ?*
  - *Can we have a SB triggering or fueling an AGN ?*
  - *Need to move beyond simple yes or no. How does the fuel supply or fueling rate relate to the importance of the AGN for the global energetics and ISM feedback ?*
- *What fraction of stars are formed in mergers/interactions and are the LF's affected ?*
  - *Are interactions (at $z < 1$) just a blip for all but LIRGs/ULIRGs ? Is the merger ⇒ ULIRG ⇒ QSO ⇒ Elliptical path only important for $z < 2$.*
  - *Do clusters know they have been formed in a merger ?*
  - *Are the variations in SFR, SFR density, AGN fraction we see with luminosity at low-z understood ? Are local LIRGs/ULIRGs really good analogs for luminous systems at high-z ?*

Nearby Galaxies

What we need

- *Balance between volume-limited surveys, and detailed, multi-wavelength studies of individual representative types. "Closing the loop" on galaxy formation.*
  - *SINGS, SAGE, ANGST are examples, but we need to go out perhaps 2-3x farther (10-15 Mpc) to get a more complete sampling of SFRs, SFR densities, Hubble type (e.g. giant E's). Requires UV ⇒ MIR images of 200-300 galaxies.*
  - *High-resolution polychromatic maps of more nearby systems (e.g. Antennae, M82, M51) covering quiescent and interacting/merging stages. Age-date clusters, find ULX's, map outflows, chart the radio-IR correlation inside galaxies.*
- *More IRS spectra (fine structure lines, warm H_2, PAH, H_2O, etc.).*
  - *Bigger, deeper maps of very nearby systems (super SINGS). Don't necessarily need "complete" maps. Variation within galaxies vs. radius and azimuth.*
  - *Samples of integrated or nuclear spectra at z < 0.5 covering LIRG-like ($10^{11}L_\odot$) luminosities. Closer to dominant z=1 IR pop.*
- *Don't forget the cold gas (fuel). CO, HI*

Nearby Galaxies



Nearby Galaxies

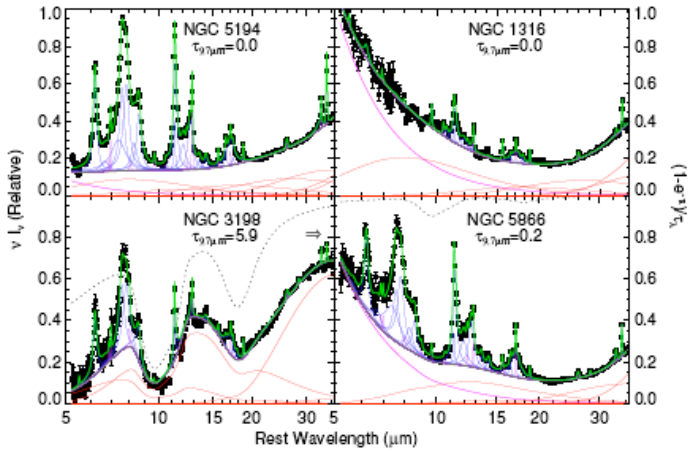


FIG. 4.— Example decomposition of four SINGS spectra, for sources with and without significant silicate extinction, and dominated by either stellar or thermal dust continuum at short wavelengths. All plot symbols as in Fig. 3. Logarithmic wavelength axis.