SBS0335-052 and Blue Compact Dwarf Galaxies

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SBS0335-052

- Very low metallicity: $Z \approx 1/41 Z_{\odot}$
- Distance: 57.6 Mpc
- SBS0335-052E and SBS0335-052W
- Six regions of massive star formation
- Luminosity: $\sim 10^9 L_{\odot}$, of which 75% comes as MIR radiation.
- Age: old or young?
  - a) less than 25 Myr for the star forming regions
  - b) at least 1 Gyr for SBS0335-052W
Observation

- Infrared Spectrograph (IRS)
  - Low resolution modules (5-38μm): SL and LL
  - High resolution modules (10-37μm): SH and LH
- Peak-up camera at 22μm: 6 images
  - to locate the MIR centroid of the source and move it to the center of the spectrograph;
  - to obtain broad band imaging
SBS0335-052 and NGC7714
IR luminosity and dust mass

Than et al. (1999) : the starburst responsible for the heating the dust which produces the MIR radiation is heavily obscured with an extinction of : $A\nu \sim 20 \text{mag}$

- Dale et al. (2001) : the optical extinction to the starburst is less than 1 mag

- Mass of the cool dust component from IRS: much less than previous estimates (cold dust component is much warmer and produces less flux)
MIR spectra from Spitzer IRS
MIR slope vs metallicity

Metallicity (Z/Z_☉)

Graph showing the relationship between MIR slope and metallicity.
PAH EW vs metallicity

![Graph showing the relationship between PAH EW and metallicity.](image)
PAH EW vs [NeIII]/[NeII]

([NevII])/([NeII])

PAH6.2 μm (EW)

PAH11.2 μm (EW)

1.00

0.10

0.01

1.00

0.10

0.01

1

10

PAH EW vs [NeIII]/[NeII]*L_{22\mu m}/V

![Graph showing PAH EW vs [NeIII]/[NeII]*L_{22\mu m}/V](image)
PAH EW vs \([\text{NeIII}] / [\text{NeI}]\) \* (L_{22\mu m} / V) \* (1 / Z)
Conclusions

- The ratio of the 22\(\mu\)m/16\(\mu\)m flux density is \(\sim2.5\) for nearly all BCDs and shows no metallicity dependence. The 22\(\mu\)m/8\(\mu\)m (or 24\(\mu\)m/8\(\mu\)m) ratio also shows considerable scatter, thus making prediction on the presence of PAHs based on mid-IR broad band colors challenging.

- We detected PAH emission, at 6.2, 7.7, 8.6, 11.2 and 12.8\(\mu\)m, though their strength varies substantially in our sample.

- PAH Ews are generally suppressed in more metal poor BCDs.

- PAH Ews decrease with the increase of [NeIII]/[NeII] ratio, that is, as the ionization field becomes harder.

- The strongest relation we have found is the anti-correlation between the PAH EW and [NeIII]/[NeII]\(\times(L_{22\mu m}/V)*(1/Z)\) and this suggests that the deficiency of PAHs in low metallicity environment is a combination of formation and destruction effects.
Thank You