Dust Obscured Galaxies



Distant Galaxy in the Hubble Ultra Deep Field

Spitzer Space Telescope • IRAC Hubble Space Telescope • ACS • NICMOS

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Obscured Galaxy Populations

- We know that a lot of star formation locally is obscured by dust
- Sub-mm observations, e.g., at CSO or JCMT using SCUBA instrument reveal a population of luminous obscured sources





M82, a Prototypical Starburst Galaxy





The spectrum of M82, UV to sub-mm



Sub-mm K-Corrections

As dusty galaxies are redshifted, the observed bandpass climbs the Wien side of their thermal emission spectrum, resulting is a negative K-correction - so distant obscured sources may even get brighter at higher z's, and easier to detect



Sub-mm Source Counts

Current technology limits us to only the most luminous obscured sources at high redshifts (and redshifts for most of them are still unknown)

Thus, one has to model their counts and evolution using a lot of assumptions ...



Optical IDs of SCUBA Sources

Given the poor angular resolution of the current sub-mm telescopes, optical IDs and thus redshifts for many of these sources are highly uncertain

Sometimes one can use radio IDs from VLA as a step towards getting the optical IDs and then the redshifts



Redshifts for Radio-Selected SCUBA Sources



- VLA positions for 70% of $f(850\mu m) > 5 \text{ mJy} (20\% \text{ b/g})$
- **Redshifts are typically** $z \sim 2 3$ (as expected)
- Many SCUBA sources seem to contain active nuclei

Next:

The Star Formation History of the Universe



and the Chemical Evolution of Galaxies