JCMT SCUBA-2 follow-up of hot dust-obscured galaxies

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A new population of hyperluminous, dust-obscured galaxies

W1W2-dropout selection (Eisenhardt et al. 2012)

✧ Faint @W1/W2;
✧ Bright @ W3/W4;

At z~2-3
✧ W3/W4 trace AGN- or SB-heated hot dust,
✧ W1/W2 sample the rest NIR obscuration.
Publications and revealed properties

- Eisenhardt et al. 2012
- Tsai et al. 2015;
- Assef et al. 2015;
- Jones et al. 2014;
- Stern et al. 2014;
- Piconcelli et al. 2015;
- Diaz-Santos et al. 2015;

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**High-z**

- SMA
- CARMA
- HST
- Keck K
- Zoom-in

**High-luminosity**

- ALMA

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No lensing
No beaming
Intrinsically luminous
Visual classification of Hot DOGs morphology

a high merger fraction

Fan et al. 2016a
Infrared spectral energy distributions and central engine

**IR SED**

**X-ray spectrum**

MIR-dominated (hot dust)

heavily-obscured, Compton-thick AGN

**Hot Dust-Obscured Galaxies (Hot DOGs)**

Central engine: buried AGNs
SCUBA-2 follow-up of Hot DOGs

- 15A and 15B semesters (July 2016 completed)
- ~38hrs allocated; ~20hrs observed
- 10 Hot DOGs, each with 2hrs obs, ‘CV DAISY’ mode
- Redshift range: 2.0-3.7
- The optical depth at 225 Ghz: 0.08<\tau<0.12 (band 3)
- 850um rms: 2.1-3.1 mJy
- 4/10 detected at >3\sigma
Detailed IR SED decomposition
Torus model (blue) + Gray body (green)

Fan et al. 2016b
Constrain the cold dust emission
Constrain the cold dust emission
Cold dust emission only contributes a small portion of total IR luminosity.

AGN torus emission dominates!
serendipitous sources in the 1.5-arcmin-radius SCUBA2 map

$>3\sigma$: 14
(diamonds)
$>3.5\sigma$: 5
(squares)
Cumulative number counts of SMGs around Hot DOGs

1-4 times larger compared to other surveys and models

As a comparison, radio-selected Hot DOGs: 10-30 times larger (Silva et al. 2015)
Summary

- SCUBA-2 850um photometry of 10 Hot DOGs shows a 40% detection rate.

- We try to constrain the cold dust emission in Hot DOGs by using SED decomposition. We find that the cold dust emission only contribute a small portion.

- We search the serendipitous sources around Hot DOGs in the 1.5-arcmin-radius map and find 14/5 sources at $>3.0\sigma/3.5\sigma$, respectively.

- Cumulative number count of SMGs around Hot DOGs only show a moderate overdensity, compared to those around radio-selected Hot DOGs.