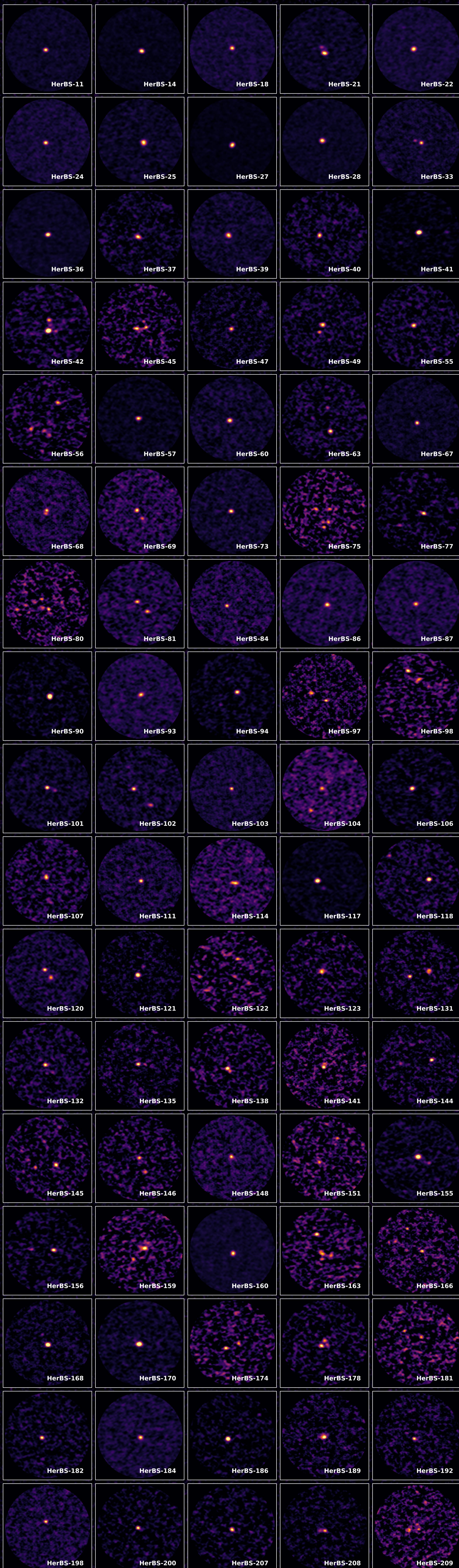


ALMA photometry results from the Bright Extragalactic ALMA Redshift Survey (BEARS)

George Bendo, UK ALMA Regional Centre Node, The University of Manchester

MANCHESTER
1824
The University of Manchester



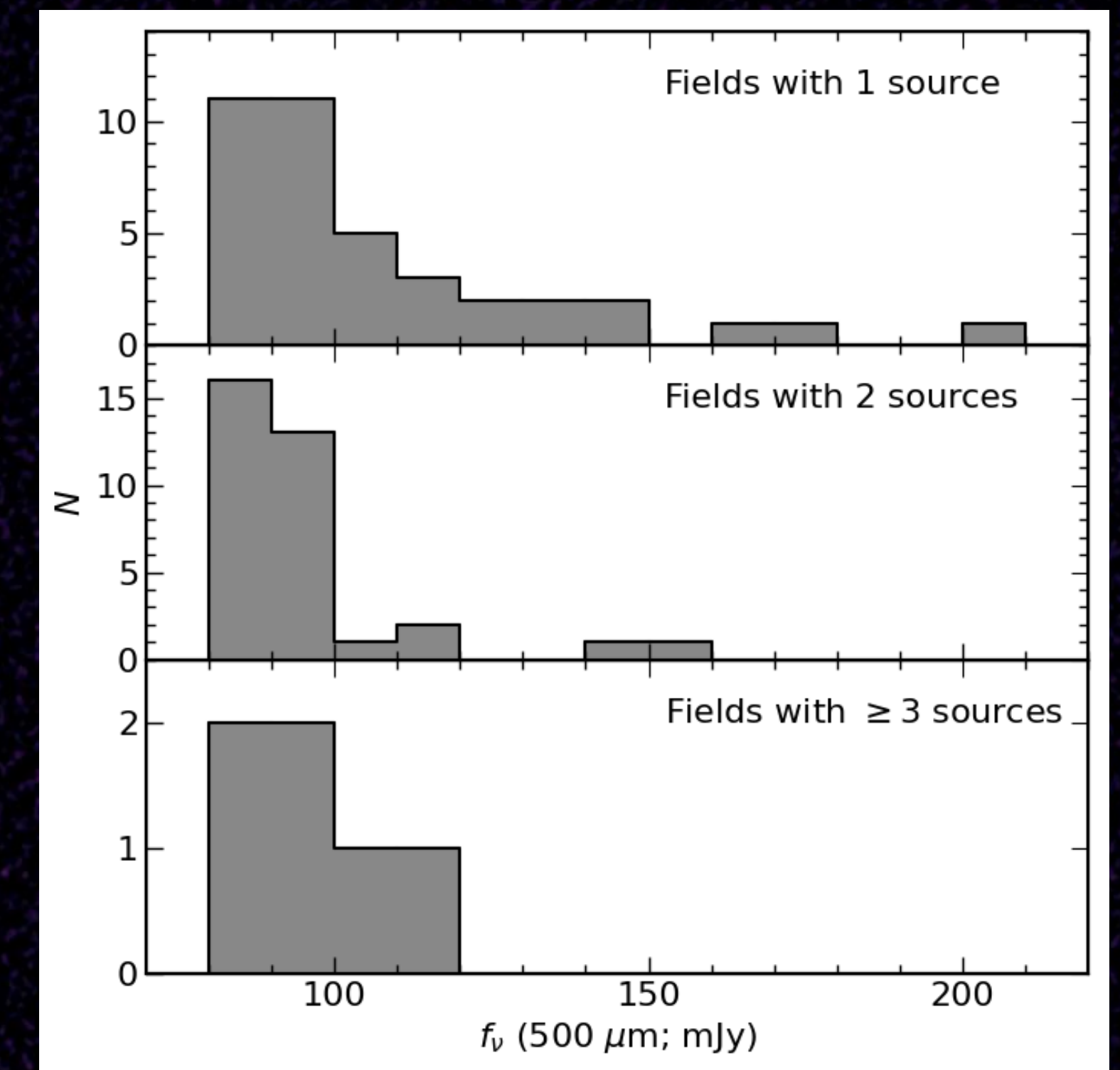
ALMA 151 GHz images of all fields observed by BEARS.

Survey Overview

- 85 gravitational lens candidates were selected from the Herschel-ATLAS observations of the South Galactic Pole using the following criteria:
 - $f_{\nu}(500 \mu\text{m}) > 80 \text{ mJy}$
 - $z_{\text{phot}} > 2$
- ALMA performed spectral scan observations in following bands at the following frequencies:
 - Band 3 (86.6 – 115.7 GHz or 89.6 – 112.8 GHz)
 - Band 4 (139.0 – 162.2 GHz)
- The survey produced the following results:
 - 73 sources with spectroscopic redshifts
 - 142 continuum sources
- Three papers published on the results so far:
 - Urquhart et al., 2022, MNRAS, 511, 3017
 - Bendo et al. 2023, MNRAS, 522, 2995
 - Hagimoto et al., 2023, MNRAS, 521, 5508

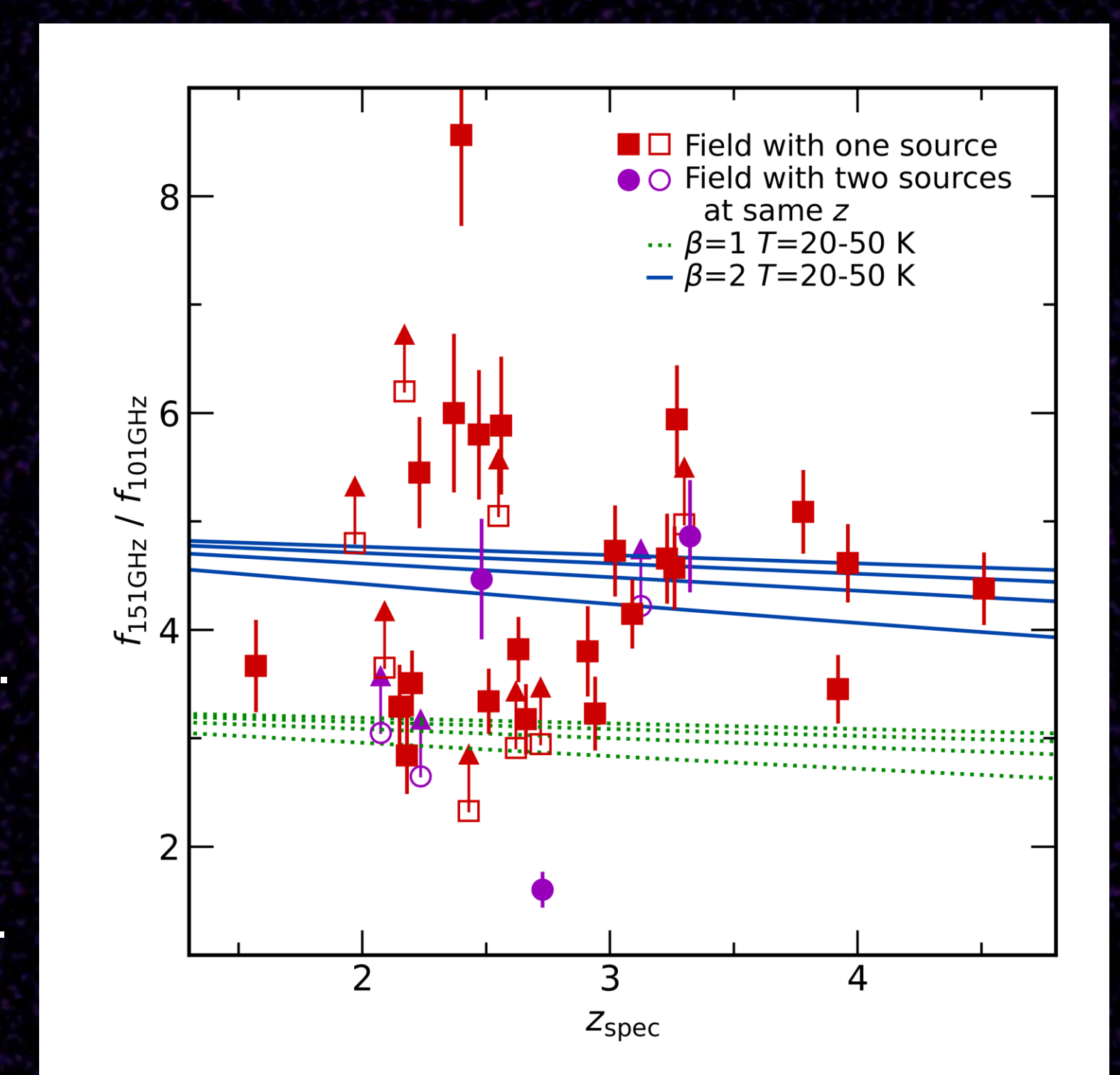
Multiplicities

- Unusually, many fields in BEARS contain single, bright sources, while prior surveys had found that fields with high flux densities can always be resolved into multiple sources.
- 9% of the fields contain two or more sources at the same redshift that are very likely to be physically associated.
- 8% of the fields contain two or more sources at different redshifts, clearly showing that some of the detected sources are confused.



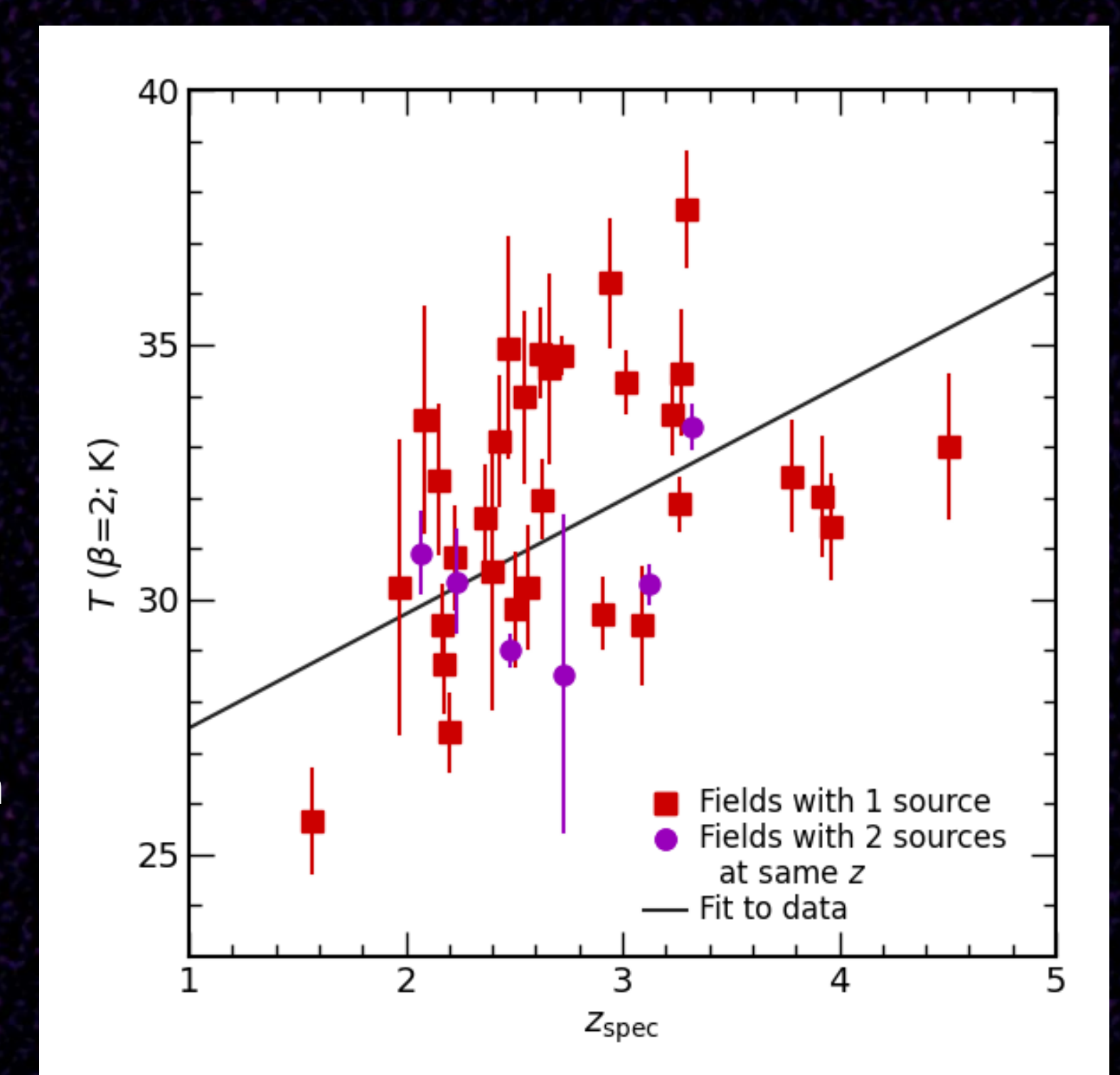
Dust emissivities

- Modified blackbodies fit to (observed frame) 250 μm - 2.97 mm data produce results with emissivity indices β that depend on redshift (as a result of the blending of dust at multiple temperatures at shorter wavelengths).
- The 151/101 GHz (ALMA Band 4/ALMA Band 3) ratios provide more reliable measurements of β with only very weak dependencies on redshift and temperature.
- The 151/101 GHz ratios are largely consistent with $\beta = 2$.
 - Some lower ratios may indicate the presence of free-free or synchrotron emission.
 - One object with a high ratio could have a very high β , although the S/N of the 101 GHz measurement is low.



Colour temperature variations with redshift

- For fields with single objects with z_{spec} measurements or fields with two objects with the same z_{spec} , the colour temperature (derived using $\beta = 2$) only varies weakly with redshift.
- This result is similar to what has been found in other dusty objects selected in far-infrared/submillimetre/millimetre bands but not for main sequence galaxies selected in optical/near-infrared bands, indicating that the strength of this relation depends on sample selection effects.



Spectral energy distribution (SED) templates

- For fields with single objects with z_{spec} measurements or fields with two objects with the same z_{spec} , existing SED templates yield z_{phot} values that are $\sim 15\%$ lower than the z_{spec} values.
- The SED templates generally use dust temperatures that are colder than what is measured in the BEARS sample, leading to the low z_{phot} values.

