Poster #2: CI as a tracer of gas mass in star forming galaxies

Nathan Bourne (IfA, U. Edinburgh)
with Jim Dunlop and Jim Geach

- Observations of cold gas at high redshifts for the most part rely on CO as a tracer
  - CO has well known drawbacks – it is optically thick – gas mass calibration depends on gas density, distribution, and metallicity.
  - Additionally, at high redshifts CO(1-0) at 115 GHz becomes hard to observe and higher-excitation transitions must be used [e.g. CO(3-2)]

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  - currently available for large samples at range of redshifts
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- Can we do better with [CI]?
  - Optically thin: luminosity directly related to gas mass
  - Dynamical PDR modeling suggests [CI] should trace H2 robustly over a wider range of metallicity and gas density conditions than CO(1-0) (e.g. Papadopoulos et al. 2004; Papadopoulos & Geach 2012)
  - The 492GHz [3P1-3P0] emission line is accessible over a wide range of redshifts in e.g. ALMA Band 6 (z=1), Band 3 (z≈4)

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- We need to test [CI] in a more representative sample of high redshift star-forming galaxies

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- So we used ALMA to observe a sample of 10 galaxies at z=1, with a range of properties spanning the stellar mass – SFR plane
- We study the [CI]-continuum correlation since galaxies with a common dust/gas ratio should follow a tight correlation *if* the [CI] line is a robust tracer of gas mass

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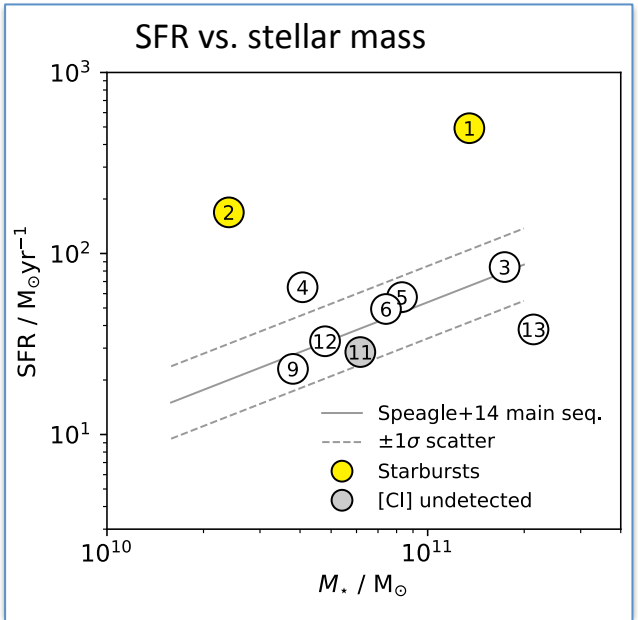

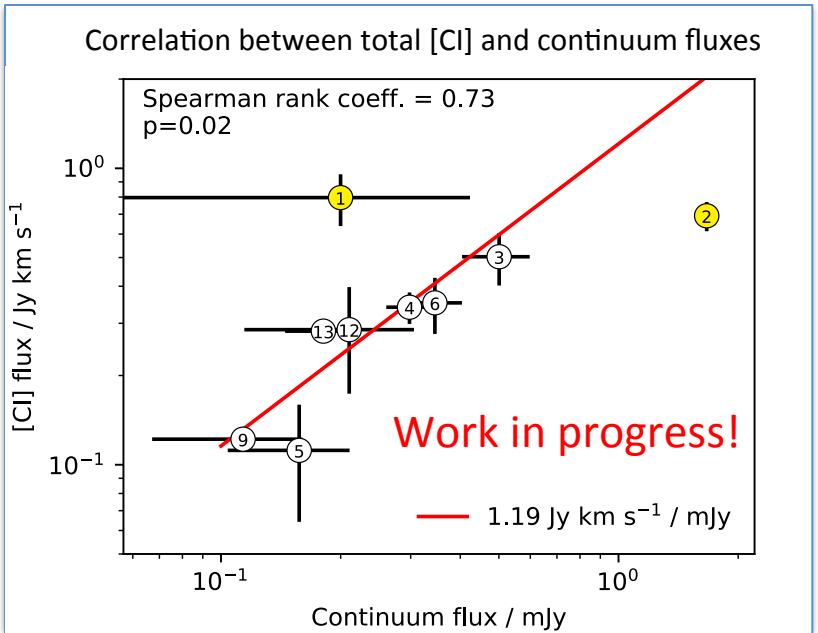

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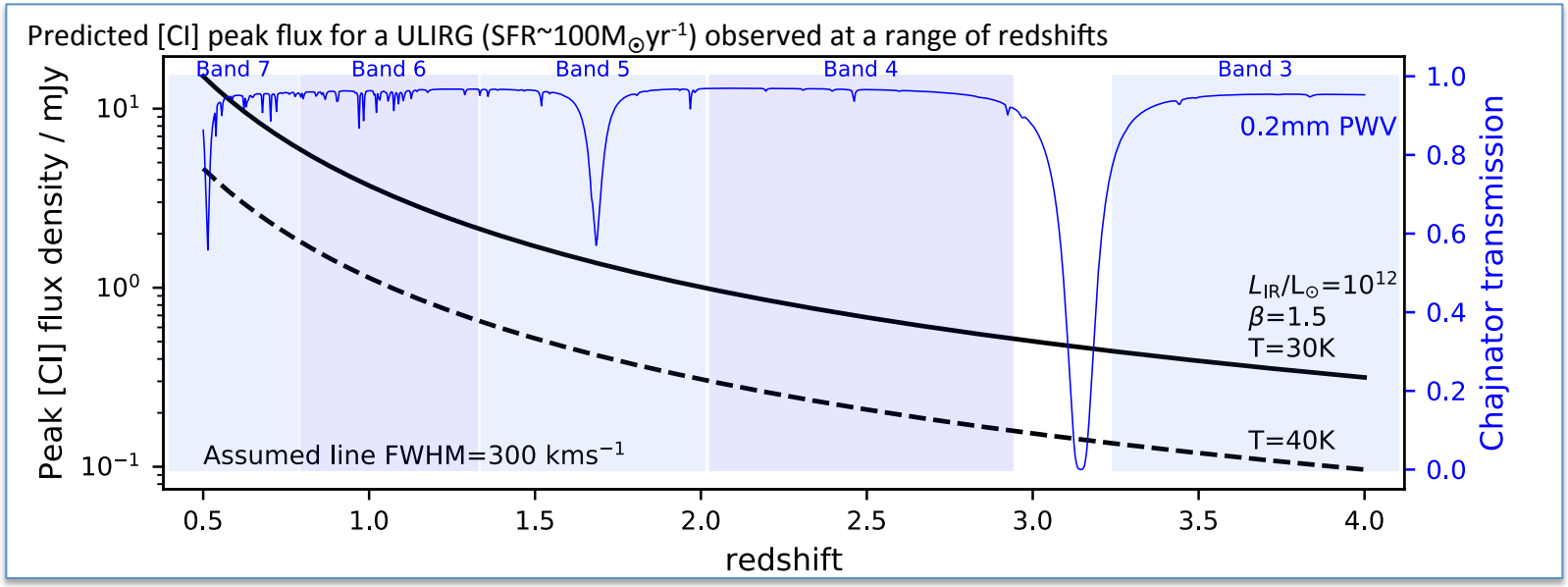

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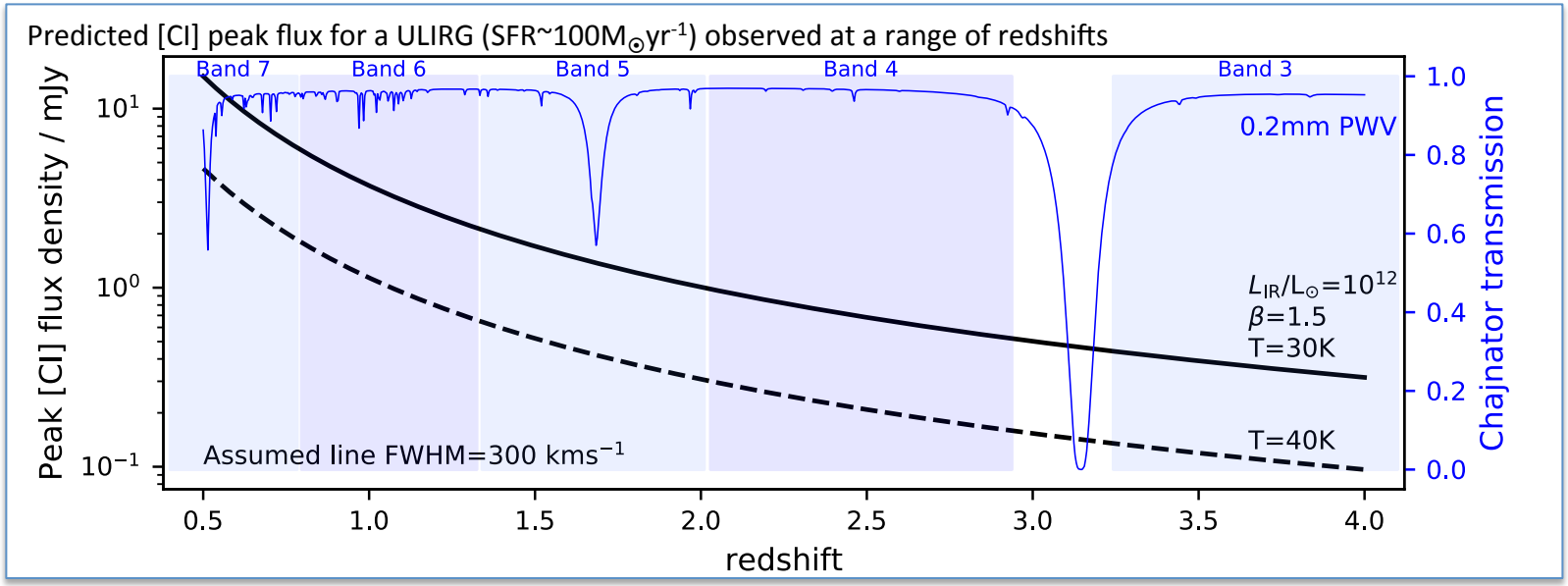

- [CI] has the potential to be competitive with CO, and has several advantages
- But we need to confirm the correlation with more detailed data (understand dust/ gas, metallicity, excitation) and build larger samples over the coming years