

(Supra-)Thermalised CO in normal, $z\sim 2$, star-forming galaxies

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To measure the molecular gas content of $z\sim 2$ galaxies, the community relies heavily on observations of CO(3-2) emission, often taken with NOEMA. However, the measured CO(3-2) line luminosities first have to be down-converted to CO(1-0) line luminosities before being converted to molecular gas masses. This down-conversion is most often performed based on the assumption of a CO(3-2)-to-CO(1-0) line luminosity ratio of ~ 0.5 . But, does this value always hold true for the main-sequence star-forming galaxies to which it is applied? Our recent findings indicate that the answer may be "no". We observed the CO(1-0) and CO(3-2) emission of eight galaxies at $z\sim 2$. At least four of these show elevated line ratios, consistent with thermalized CO. If this applies to larger samples it may mean that molecular gas masses are systematically overestimated at $z\sim 2$. Moreover, it poses the next interesting problem - how can the global CO emission appear thermalized?