

ABSTRACT

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Weak ^{13}CO in the Cloverleaf Quasar: Evidence for a Young, Early generation Starburst

Observations of ^{12}CO at high redshift indicate rapid metal enrichment in the nuclear regions of at least some galaxies in the early universe. However, the enrichment may be limited to nuclei that are synthesized by short-lived massive stars, excluding classical "secondary" nuclei like ^{13}C . Testing this idea, we tentatively detect the ^{13}CO (3-2) line with the PdBI interferometer at a level of 0.3 Jy km/s toward the Cloverleaf quasar at redshift 2.5. Large Velocity Gradient calculations, simulating seven ^{12}CO and the one ^{13}CO transition, yield $^{12}\text{CO}/^{13}\text{CO}$ abundance ratios well in excess of 100. A potential conflict with optical data, indicating high abundances also for secondary nuclei in quasars of high redshift, may be settled if the bulk of the CO emission is originating sufficiently far from the active nucleus of the Cloverleaf.