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Title:	A blind green bank telescope millimeter-wave survey for redshifted molecular absorption
Authors:	Gupta, A. (/jspui/browse?type=author&value=Gupta%2C+A.)
Keywords:	Galaxies: high-redshift Molecular processes Quasars: absorption lines
Issue Date:	2014
Publisher:	Institute of Physics Publishing
Citation:	Astrophysical Journal, 782(1)
Abstract:	We present the methodology for "blind" millimeter-wave surveys for redshifted molecular absorption in the CO/HCO ⁺ rotational lines. The frequency range 30-50 GHz appears optimal for such surveys, providing sensitivity to absorbers at $z \gtrsim 0.85$. It is critical that the survey is "blind," i.e., based on a radio-selected sample, including sources without known redshifts. We also report results from the first large survey of this kind, using the Q-band receiver on the Green Bank Telescope (GBT) to search for molecular absorption toward 36 sources, 3 without known redshifts, over the frequency range 39.6-49.5 GHz. The GBT survey has a total redshift path of $\Delta z \approx 24$, mostly at $0.81 < z < 1.91$, and a sensitivity sufficient to detect equivalent H ₂ column densities $\gtrsim 3 \times 10^{21} \text{ cm}^{-2}$ in absorption at 5σ significance (using CO-to-H ₂ and HCO ⁺ -to-H ₂ conversion factors of the Milky Way). The survey yielded no confirmed detections of molecular absorption, yielding the 2σ upper limit $n(z = 1.2) < 0.15$ on the redshift number density of molecular gas at column densities $N(\text{H}_2) \gtrsim 3 \times 10^{21} \text{ cm}^{-2}$.
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