

Evolution of the Mass-to-light Ratio of Galaxies to $z \sim 0.25$

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Abstract. We present the first results of a targeted survey carried out with the 305m Arecibo radiotelescope to detect HI-line emission from disk galaxies at redshift $z > 0.16$. We are using this sample to study the evolution of the zero point of the Tully-Fisher relation (TFR) for galaxies at intermediate redshifts. Compared to optical widths, HI measurements sample a larger fraction of the disks, where the rotation curves are typically flat, and are not affected by slit smearing and misalignment or by aperture effects. Thus, in contrast to studies based on optical spectroscopy, this dataset allows for a direct comparison with the local TFR that is technique independent.

Keywords. galaxies: kinematics and dynamics, radio lines: galaxies

Detection of 21 cm emission from galaxies at $z > 0.1$ is challenging, due to the weakness of the signals, presence of radio frequency interference, and increased beam confusion. Since accurate redshifts of the targets must be known in advance, we extracted our sample from the Sloan Digital Sky Survey (SDSS; York *et al.* 2000) database. We obtained HI profiles of adequate quality for velocity width measurements for 20 galaxies with $0.17 \leq z \leq 0.25$, with average total integration times between 2 and 6 hours. Fig. 1 shows the highest redshift detection of HI emission from a normal galaxy to date ($z = 0.2455$). The HI spectra of 12 of the 20 detections are presented in Fig. 2 (online version only).

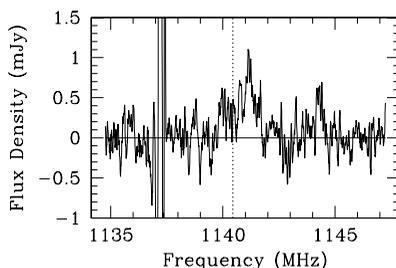


Figure 1. Calibrated, smoothed HI spectrum of SDSS J142735.69+033434.2, the highest redshift detection in our sample. The dotted line indicates the frequency corresponding to the SDSS redshift ($z=0.2455$).

The analysis of the selection biases of this sample, necessary to establish if there is a change of the TF zero point based on this dataset, is in progress and will be presented elsewhere.

Reference: York, D. G. *et al.* 2000, *AJ*, 120, 1579

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Appendix A. Online material

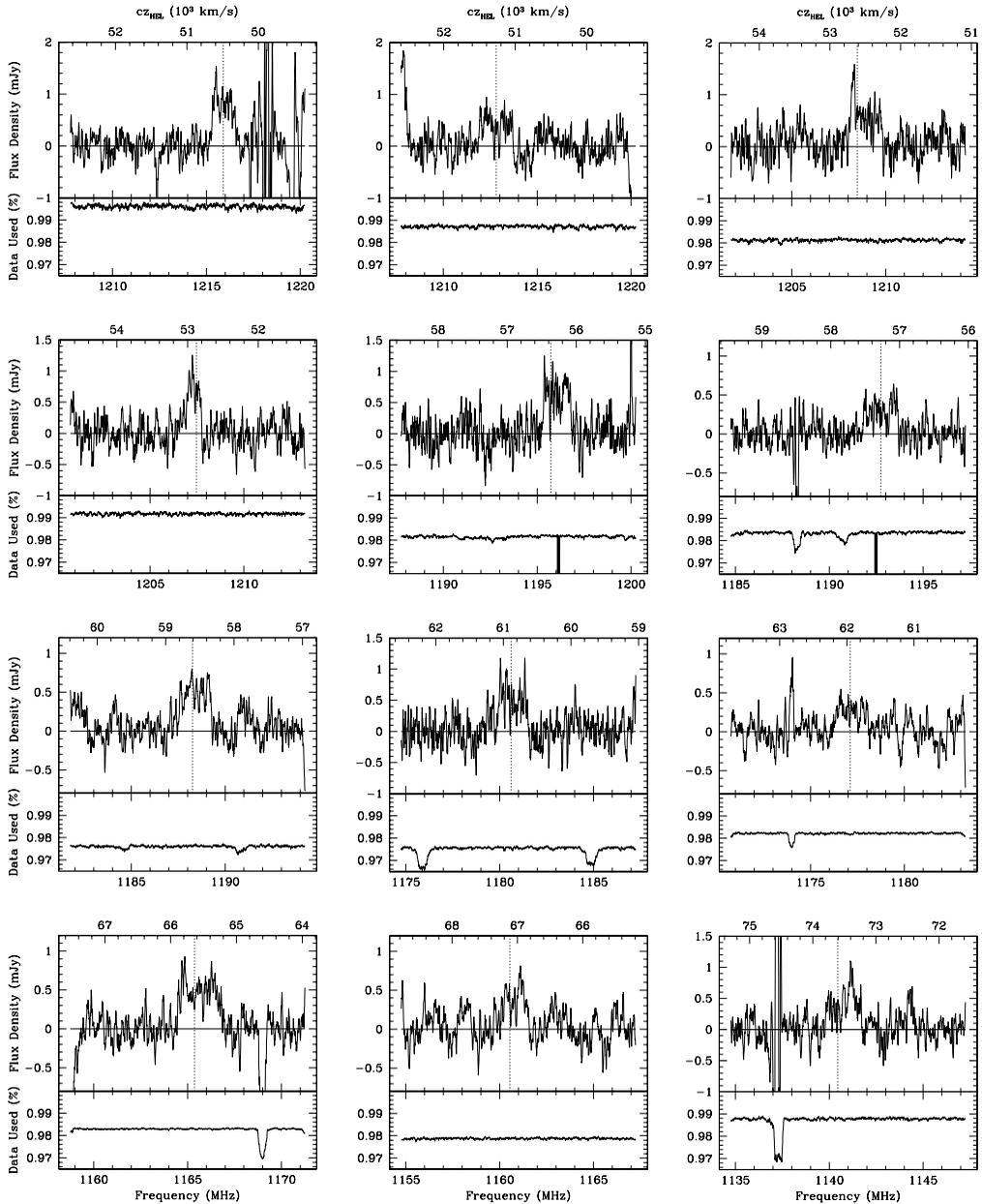


Figure 2. Calibrated, smoothed HI spectra, ordered by increasing redshift z (top-left to bottom-right) of 12 of 20 galaxies detected at Arecibo. The dotted line in each spectrum indicates the frequency corresponding to the SDSS redshift. The panel under each spectrum shows the percentage of data that was used at each frequency, after excision of radio interference and rejection of bad records.