

The Ultra Deep Survey (AUDS)

ALFA can be used for extragalactic surveys out to a redshift of $z \approx 0.15$. Blind surveys to such redshifts require high sensitivity for the detection of all but the most gas rich galaxies. The **ALFA Ultra Deep Survey** (AUDS) project aims to conduct a deep HI survey of an area of about 0.5 square degree with a $\approx 50 \mu\text{Jy}$ sensitivity.

The goals of the survey are:

- investigation of the the evolution of the gas contents in the universe at $z < 0.15$
- search for traces of the Cosmic Web
- low column-density gas in the local Universe
- search for extragalactic OH Megamaser Emission
- search for extragalactic HI Absorption

Collecting such deep HI maps of significant areas on the sky was prohibitively expensive before ALFA, but is in principle feasible with ALFA using integrations times of less than 100 hours per beam. Currently, a precursor program tests the feasibility of such a project by mapping a field known to contain several gas rich galaxies at different redshifts. As of November 20, about 4 hours per beam integration time have been collected on that field. The data were used to construct a map with an rms noise of about $180 \mu\text{Jy}$ per beam per channel. Some early results are shown in figure 1 and 2.

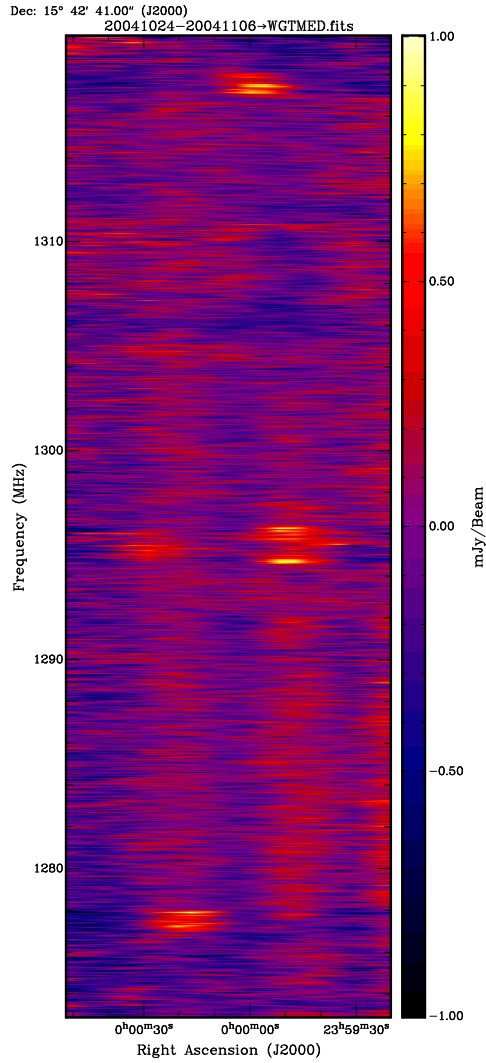


Figure 1: Position - frequency map of the most sensitive part of the AUCS precursor survey as of November 20. At least four HI rich galaxies have been detected, the most distant one at $f \approx 1277.5$, i.e. $z \approx 0.112$. This map was produced with a modified version of the livedata/gridzilla package AIPS++ package originally developed at the ATNF for HIPASS data reduction.

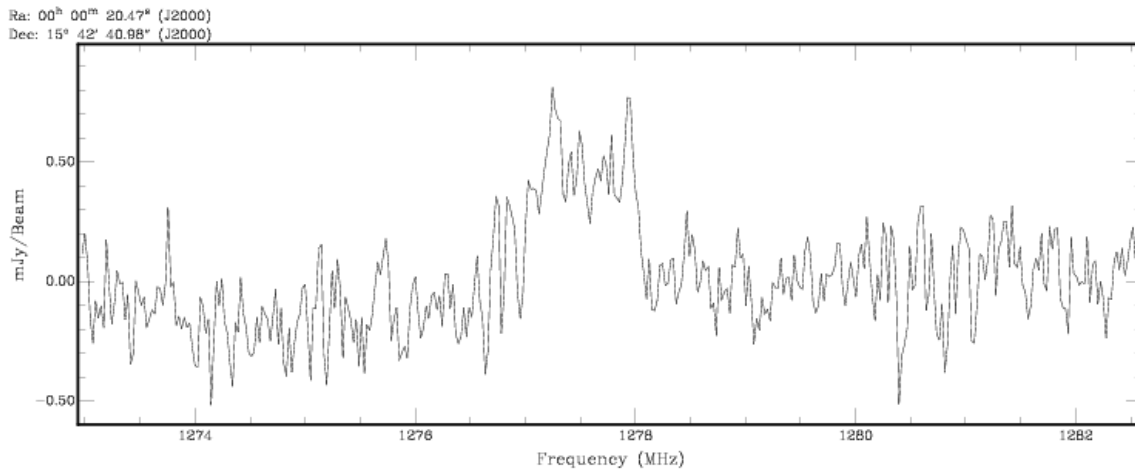


Figure 2:

Spectral cut through the map shown in figure 1 at the position of the $z \approx 0.112$ galaxy. The HI mass of the galaxy estimated from the integrated flux is about $8 \cdot 10^9 M_{\odot}$.