**Complex Structure in the ALFALFA HI Distribution around Virgo HI21**


**Introduction**

One of the principal drivers of the ALFALFA survey is the exploration of the dynamics of the Virgo cluster and its environs via the cataloguing of all of its gas-rich members and the tracing of disruptive events through the HI remnants they leave behind. The wide area coverage provided by ALFALFA is ideal for the study of extended source structures, and its sensitivity, bandwidth, and resolution (both angular and spectral) allow the detection of HI over the full Virgo redshift range as well as the identification of gas-rich background objects. Several companion posters discuss other aspects of the 2005 ALFALFA dataset covering parts of Virgo: 179.20, 179.22 and 179.25. Here, we present results from the preliminary analysis of the ALFALFA 2005 dataset covering a 3° by 3° field centered at R.A.,Dec(J2000) = 12°08’, +14°30’. Lying on the periphery of the dense X-ray gas, this region is rich in spiral galaxies and also includes the enigmatic HI cloud VirgoHI21, suggested by Davies et al. (2004, MNRAS 349, 922) and Minchin et al. (2005a, ApJ, 622, L21; see also poster 188.13) to be a starless “dark” cloud.

**The Dataset**

ALFALFA is a drift scan survey employing the 7-beam Arecibo L-Band Feed Array (ALFA). Two separate drift passages of each sky position are made, separated by 3-9 months, to aid in the discrimination of radio frequency interference (RFI) from cosmic sources.

The data cubes used for the present analysis were constructed from the spring 2005 ALFALFA data and do not represent a complete dataset. In particular, several second passes have not yet been performed and several drift sequences were corrupted by RFI. The left panel illustrates the coverage, and its current state of incompleteness. Further observations are scheduled over the next month.

**Data Processing**

Data processing makes use of the ALFALFA-IDL pipeline. Identification of sources is performed both visually (strong sources) and using both a Fourier domain signal extraction technique applied to both 2-D and 3-D datasets. This algorithm is described in the accompanying poster by Amélie Saintonge (187.02). Here, the full power of the signal extraction has not been applied due to the current incompleteness of the dataset.

**Beyond Virgo**

The 100 MHz bandwidth employed by ALFALFA delivers a usable spectral window corresponding to HI redshifts from -500 to +17,000 km/s. ALFALFA detects lots of gas-rich late-type galaxies belonging to structures behind Virgo.

**Low mass galaxies in Virgo**

ALFALFA is designed to detect low mass galaxies in the local universe.

**Debris in Virgo or Milky Way HVC?**

NGC 4192, a large, massive spiral, has a recessional velocity of -135 km/s. At its southeast edge (+ velocities), the HI warp joins the positive HVC 263-745-103 (Wakker & van Woerden 1991 A&A 250, 509). The HI feature is very broad (80 km/s). Positive velocity HVC’s are rare in the northern galactic hemisphere and even more rarely are HVC’s that broad in velocity.

**Complexity in Virgo**

- On the edge of the X-ray emission Southern portion contains many galaxies at cz<500 km/s, likely members of Virgo Cloud A
- Galaxy density is high
- 35 objects in field clearly detected by ALFALFA (at current sensitivity) in Virgo redshift range

**The ALFALFA Survey**

The Arecibo Legacy Fast ALFA (ALFALFA) Survey will map 7000 square degrees of high galactic latitude sky visible with the Arecibo telescope. See http://www.astro.cornell.edu/alfalfa for survey details. The ALFALFA team is an open collaboration of more than 50 researchers from 34 institutions in 13 countries. This work was supported in part by NSF grants AST-0307661 and AST-0435697 and by a grant from the Brinson Foundation.