An Undergraduate Research Project within the ALFALFA Collaboration.

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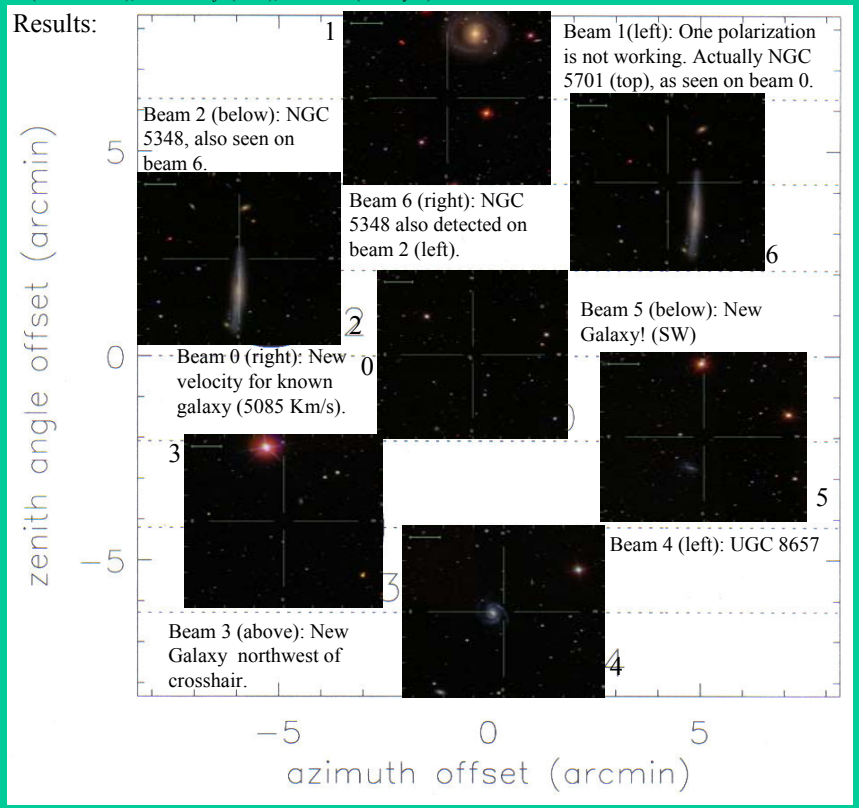
Introduction:

The ALFALFA project is an ongoing high sensitivity HI line survey with the 305m Arecibo telescope that will cover 7000 square degrees of sky and is expected to detect some 20,000 HI sources (Giovanelli et al. 2005). ALFALFA will make major contributions to the understanding of the structure and evolution of galaxies in the local Universe. In July 2005 an Undergraduate Research Workshop was held at Union College, Schenectady (see poster by Koopmann et al.). Participants included 14 undergraduate students, 2 graduate students and 9 faculty members from 7 universities, in addition to the Director of the Arecibo Observatory Visitor Center. The undergraduate students prepared and submitted an observing proposal to the Observatory. Students engaged in an observing session with the Arecibo telescope, which was carried out remotely from the lecture room at Union College. The region observed included a nearby loose group of galaxies, LGG 362, dominated by NGC 5363/5364. The group is an example of an intermediate galaxy density environment. As part of the workshop, the data were processed and the scientific analysis started. This poster presents some of the results of this analysis.

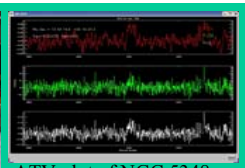
Materials and methods:

The Arecibo Observatory has the world's most sensitive radio telescope at L–band. In addition to that all–important sensitivity advantage, Arecibo equipped with the seven beam detector ALFA offers important and significant improvements in angular and spectral resolution over the available major wide area extragalactic HI line surveys such as HIPASS and HIJASS. The observations were done with the telescope stationed at azimuth=180 degrees. The feed array was rotated 19 degrees, yielding a configuration in which the sky footprints of its seven individual beams sweep tracks on the sky equally spaced in declination (~2.1 arc-minutes) as the Earth rotates. Drift scans of 900 seconds duration were taken sequentially, with about 3-4 seconds of dead time between one scan and the next. The backend spectrometer system consisted of a set of four WAPPs (Wideband Arecibo Pulsar Processor), which allowed instantaneous autocorrelation and sampling of 16 time series, each yielding a 100 MHz wide spectrum of 4096 channels. Fourteen of those were used to process and record the two independent polarization channels of each of the seven beams of ALFA. The spectral resolution of 25 kHz corresponds to R = $\lambda/\Delta\lambda \cong 57{,}000$, or 5.3 km s^-1, at the 1420 MHz rest frequency of the HI line.

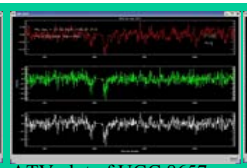
Results:



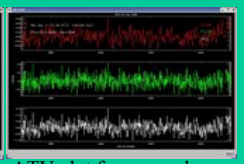
ALFALFA team during the observing session on July 6, 2005.



ATV plot of NGC 5348, as detected with beam 6.



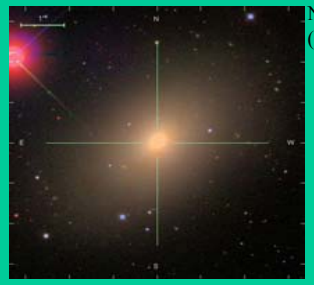
ATV plot of UGC 8657 as detected with beam 4



ATV plot for new galaxy detected with beam 3.

Discussion:

After analyzing the data we ended up with 221 detections, and we have yet to use A. Santoigne's signal extractor to compare these to our data. This number will be reduced because we have not eliminated detections that correspond to the same source in different beams. This field has many galaxies, and SDSS images are used to identify the source. When the field has many galaxies, this identification is difficult. During these observations beam 1 was having problems and the data was highly attenuated, making it difficult to find candidates when inspecting the images using the ATV. The work is in progress and we are eager to get the most out of it.



NGC 5363 from SDSS (left).

References:

1. Haynes M.P., 1981, AJ, 86, 1126.
2. Giovanelli, R., et al., 2005, AJ, 130, 2613.
3. Giovanelli, R., et. al., 2005, AJ, 130, 2598.

Acknowledgements:

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