

Proposal title: MAPPING THE FOREGROUND HI EMISSION IN THE VIRGO CLUSTER AREA

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Time frame:2010-2012

Description: The Herschel Virgo Cluster Survey (HeViCS) is an Open Time Key Program for the Herschel Space Observatory. The project will provide a fully sampled map of about 60 sq deg of the nearby Virgo galaxy cluster using both PACS and SPIRE (PMODE). This will translate into a wavelength coverage of five bands, from about 100 to 600 microns. We estimate that we will detect about 400 galaxies at 250 micron. Some data have presently (Spring 2010) been acquired and preliminary results are in press. Our science interests include:

- The detection of dust in the intra-cluster medium;
- Extended cold dust around galaxies;
- FIR-submm luminosity functions;
- The UV to sub-mm spectral energy distribution of galaxies of various morphology;
- The detection of dust in dwarf and giant elliptical galaxies.

HeViCS is an international collaboration. The current collaborators are: Jonathan Davies (Principal Investigator), M. Baes, G. Bendo, S. Bianchi, H. Boehringer, D. Bomans, A. Boselli, M. Clemens, E. Corbelli, L. Cortese, S. Dye, S. Eales, D. Fadda, D. Garcia-Appadoo, G. Gavazzi, C. Giovanardi, M. Grossi, T. Hughes, L. Hunt, A. Jones, S. Madden, D. Pierini, M. Pohlen, M. Putman, S. Sabatini, M. Smith, S. di Serego Alighieri, C. Vlahakis, E. Xilouris, S. Zibetti.

A detailed description of the project can be found at <http://wiki.arcetri.astro.it/pub/HeViCS/WebHome/HeViCS.pdf>

Of the above listed scientific goals, the detection and study of intra-cluster dust is obviously the most intriguing and also the most observationally challenging. To this end, independently of sensitivity issues, the primary ingredient is a careful removal of the foreground (Galactic) IR emission at spatial scales in the range from 10 arcmin to a

few degrees. Despite the favourably high Galactic latitude of the area of interest, this is a formidable task. We plan to combine the Herschel data to the existing IR databases, (IRAS and DIRBE in particular and to their results regarding Cirrus emission) and to the available surveys of local interstellar gas.

For the atomic component, 21 cm line surveys provide, thanks to the low optical thickness, a largely unbiased measurement of the HI column density. ALFALFA will supply an essential ingredient for our mapping of the foreground IR emission since: i) it encompasses the whole area of the Virgo cluster, and ii) its angular and velocity resolutions are quite well suited for our purpose. Besides the subtraction of the foreground, ALFALFA will allow the study of the dust emission properties of high-latitude Cirrus with unprecedented detail. ALFALFA is primarily aimed to extragalactic studies and the exploitation here proposed of its low-velocity range might constitute an interesting side product of the project itself. We are aware of the fact that, due to the extragalactic bias, the low-velocity data might necessitate a more careful treatment/reduction than the one supplied by the regular ALFALFA pipeline. We are willing to provide, in collaboration and under the supervision of the ALFALFA staff at Cornell, the manpower to produce the best possible data reduction of the low-velocity (-500 to +500 km/s) data in the Virgo window. Only the results, in terms of fully-reduced local-HI maps in different (about 5) velocity bins, will be made available to the members of the HeViCS consortium, while the original ALFALFA grids (datacubes) will remain under property and control of the ALFALFA collaboration.

ALFALFA region: the HeViCS area covers the field $255^\circ < l < 300^\circ$ and $63^\circ < b < 79^\circ$ in Galactic coords.

ALFALFA data to be used: Grids.

Milestones

- June 2010-June 2011: ALFALFA data reduction and HeViCS data acquisition for the whole area.
- June 2011-June 2012: data analysis