VATICAN VVV WORKSHOP

A New Galactic Survey

19 - 21 May 2015

Specola Vaticana
Castel Gandolfo, Italy
**VVV Rationale**

The VISTA Variables of the Via Lactea Survey (VVV) is an ESO public near-infrared variability survey that is sampling the Galactic bulge and an adjacent section of the Southern Galactic plane. The former hosts crucial stellar populations encompassing the Galactic center, whereas the latter features regions of intense star formation around spiral arms. This survey covers 562 sqdeg and it includes multi-wavelength (ZYJHKs) coverage of the area as well as time monitoring in Ks band. It has started in 2010 on the 4m VISTA telescope at ESO Paranal Observatory, and is scheduled to collect over 2000 hours of execution time.

The main scientific aim of the VVV survey is to unveil the 3-D structure of the inner Milky Way using well-characterized distance indicators such as RR Lyrae and Cepheid variables. However, due to the large size of this survey, and the variety of interesting astrophysical objects found in the central Galactic regions, additional survey goals were defined by the team, including:

- To find RR Lyrae in the bulge
- To identify variables belonging to known clusters
- To search for new star clusters
- To map star forming regions along the plane
- To find eclipsing binaries and planetary transits
- To search for microlensing events
- To study rare variable sources
- To monitor the variability around the Galactic Center
• To find variable stars in the Sgr dSph galaxy
• To identify background QSOs
• To find high proper motion objects and KBOs
• To search for SN Light Echoes

The deep photometry and good spatial resolution of the VVV survey have already provided crucial mapping of the Milky Way via red clump giants, which are employed to delineate the Galaxy’s bar(s), structure, distance to the Galactic center, and nature of the extinction laws. The final product of the VVV Survey will be a deep IR multi-epoch and multi-band catalog in five passbands (0.9 - 2.5 μm), plus Ks-band variability. Data from the survey is being made available to the entire community, and will foster studies of the star and cluster evolution history of the Milky Way, and provide a population census of the Galactic bulge and center, in addition to star forming regions throughout the disk.

With the VVV Survey we already embarked in interesting discoveries and there are many more to come. But when the survey completes its data taking, in the next couple of years, there will be still open questions, and we have to plan the next steps ahead. The main goal of the Vatican VVV Workshop on “A New Galactic Survey” is to elaborate a proposal for the VVV Extension. We need to consider the synergy with other survey telescopes and cameras (VST, LSST, DECAM, Euclid, Gaia), and plan a legacy for the Astronomical Community of an extended and more complete survey of the inner galactic regions, which will be inaccessible (or avoided) by some of the other surveys. VISTA is expected to complete its first generation of public near-IR imaging surveys in the coming years, and a new call for VISTA surveys will likely be issued by ESO. Additional dedicated survey instruments (MOONS, 4MOST) are also scheduled. During this 3 days workshop a strategy for a future coherent project that combines not only VISTA, but also includes other facilities, that can enable spectroscopic follow-up of interesting targets, should be made. The VVV legacy and its extension will provide new targets and questions to address with the future large facilities located in Chile like E-ELT and GMT.