Resultados Concurso Apex 2010-B

Propuesta: 2010B-668

Investigador Principal: L. Infante

Universidad: Pontificia Universidad Católica de Chile

Título: LASCAR: the LABOCA/ACT Survey of Clusters at All Redshifts

Resumen: We propose an ESO/MPG/OSO/Chile survey to obtain LABOCA 870 um maps of 15 of the most massive galaxy clusters in a 450 square degree southern strip surveyed by the Atacama Cosmology Telescope (ACT).
Our targets were identified by their 148 GHz Sunyaev-Zel'dovich Effect (SZE) decrements, which provide a redshift-independent mass selection, and confirmed with optical imaging. The LABOCA maps will exploit the clusters' gravitational lensing for the detection of background submillimeter galaxies over a range in clustercentric radius, thereby furnishing good candidates for followup with ALMA and placing valuable constraints on how severely individual galaxies may undermine the cosmological conclusions of ACT and other SZE surveys. Digging deeper, we will also use our maps to measure the clusters' SZE increments, and the 870 um flux densities of sources (or stacks of sources) selected at other wavelengths. We ask to map one cluster through Chilean APEX Observing time in semester 2010B.

Tiempo asignado: 25 horas

Propuesta: 2010B-675

Investigador Principal: G. Garay

Universidad: Universidad de Chile

Título: Unveiling the structure of the core ahead of HH 80N at sub mm wavelengths

Resumen: Ahead of HH 80N, the northern counterpart of the brightest Herbig-Haro objects known, HH 80-81, there is a dense clump that appears to be contracting at supersonic infall velocities (0.6 km s−1). Given this peculiar kinematics and the exotic environment where this core is found, we consider the possibility that the HH 80/81/80N flow has triggered or speed up the star formation process in this core. At present, we are modeling the HH 80N core combining a wide set of continuum observations at several wavelengths. This dataset includes SABOCA data acquired recently. The SABOCA map reveals an interesting complexity. Therefore, we propose to observe with a better sensitivity the HH80N core using SABOCA and LABOCA to study deeply the amazing structure hinted in this recent SABOCA map. This can help to determine the actual extension and morphology of the core, required for a proper modeling. From this, we expect to obtain an assessment of the physical properties and the evolutionary state of this core, probably related with its striking kinematic signatures.

Tiempo asignado: 9 horas

Propuesta: 2010B-671

Investigador Principal: Y. Contreras

Universidad: Universidad de Chile

Título: Study of filamentary structure across the Galactic Plane.

Resumen: One of the most recent and relevant result concerning molecular clouds, drawn from observations made during the last few years, is that they contain a large number of filamentary structures. However very little is known about the physical and kinematical properties of these structures. Hydrodynamical simulations of turbulent clouds predict that filaments may play a dominant role in the subsequent formation of small scale regions of high mass star formation. Hence, to get a better understanding of the physical processes involved in the formation of massive stars a detailed study of filamentary structures across the Galactic plane is required. We propose to undertake dust continuum observations at 350 μm that together with the 850 μm data will allow us to obtain temperatures and spectral indexes of these filamentary structures and molecular line observations which will allow us to determine the velocity field of the whole filamentary structures and to assess whether they corresponds to single large physical structures or different sub-structures along the line of sight.

Tiempo asignado: 35 horas

Propuesta: 2010B-667

Investigador Principal: G. Garay

Universidad: Univ. de Chile

Título: Search for a New Class II Methanol Maser

Resumen: We request time to carry out a search for a new class II methanol maser transition. The 42−51 A+ methanol transition, at 247 GHz, has been predicted to show maser emission. Detection of this maser would be an important confirmation of the models and would provide observational constraints to further refine the models. In addition, these observations have the potential to provide a valuable phase calibration tool for ALMA, and to uncover new molecular probes of hot molecular cores.
We have selected 24 sources, covering the early stages of high mass star formation, that we think are good candidates to host the 247 GHz maser. We request 12 hours of APEX time to survey these sources in search of this new maser.

Tiempo asignado: 12 horas

Propuesta: 2010B-679

Investigador Principal: Monica Rubio

Universidad: Universidad de Chile

Título: Cold Gas and Dust in the Magellanic Clouds with LABOCA

Resumen: The Magellanic Clouds provide unique laboratories to study gas, dust, and star formation in low metallicity environments, resembling the early phases of galaxy formation in the universe. The SMC and parts of the LMC have been extensively observed in CO line emission, but due to their low metallicities most of the molecular gas is likely to be in moderate extinction regions where CO is faint and mostly photo-dissociated. Dust emission is potentially a better molecular tracer, because of its independence from the photo-chemistry and density structure. Thus it allows for a more complete census of the dense, star forming gas distribution, and its relation to star formation activity. We propose to extend our successful LABOCA imaging program to the SMC M region, the LMC clouds N113 and Nanten52, and to one CO peak in the Magellanic Bridge. These observations will be combined with Spitzer (SAGE) and Herschel (HERITAGE) data to determine dust temperature and surface density, yielding images of giant molecular clouds at 10 pc resolution and probing dust properties in a range of environments. Comparison with CO and planned CI and CII observations with Atacama telescopes and Herschel will yield crucial constraints on the physical state of the dense gas clouds.

Tiempo asignado: 39,1 horas

Propuesta: 2010B-664-a

Investigador Principal: Gaspar Galaz

Universidad: Pontificia Universidad Católica de Chile

Título: The interstellar medium of the Local Volume Legacy Survey galaxies: 3-D molecular gas distribution

Resumen: We propose to map the 12CO(2−1) and 12CO(3−2) emissions with SHFI for one low surface brightness galaxy (NGC0055) from the Local Volume Legacy survey (LVL), for which we already have LABOCA data obtained during 2009B. The LVL is a Spitzer Space Telescope legacy program that surveys a volume-limited region of the local universe out to 11 Mpc, built upon a foundation of UV (GALEX), H!, and HST imaging from 11 HUGS and ANGST surveys. By combining fluxes in 870 μm with those measured with Spitzer we are constraining dust properties like temperature and mass, correlating such measures with the same obtained for the molecular gas, as well as with other features obtained with the wealth of multiwavelength data of the LVL. In particular, we will correlate the dust mass and temperature with those of the molecular gas. The requested telescope time is 24 hours. The remaining telescope time for next semesters, for this programme, depends on results of this proposal, since these data are fundamental to decide whether APEX/LABOCA/SHFI are well suited to study galaxies of LVL with fainter IR fluxes. These data should be clearly complemented in the near future with more powerful CO observations using ALMA.
Tiempo asignado: 12 horas

Propuesta: 2010B-676

Investigador Principal: Diego Mardones

Universidad: Universidad de Chile

Título: Constraining Star Formation Models Using the Kinematics and Chemistry of Dense Cores.

Resumen: Stars formation takes place inside the densest regions of molecular clouds, typically referred to as cores. Pre-stellar cores, dense condensations with no obvious stellar source, represent the initial conditions of star formation, while cores with young and embedded protostars represent a slight more evolved phase. Studying these early phases in the evolution of a core are crucial to fully understand the star formation process. In fact, competing star formation models predict significant differences in core ages and their infall structure. Here we propose to conduct a multi-line survey of pre-stellar and protostellar cores to study the kinematic and chemical properties of the dense gas. The proposed observations, in concert with radiative transfer models, will allow us to study the infall speed, mass infall rate, the extent of the infall region and the abundance ratio of certain key molecules that can be used as chemical clocks. Our combined results will allow us to place tight constrains on models of star formation.

Tiempo asignado: 40 horas

Propuesta: 2010B-672

Investigador Principal: L. Bronfman

Universidad: Universidad de Chile,

Título: Turbulence in Chamaeleon molecular clouds

Resumen: In the last decade, turbulence in molecular clouds has deserved numerous theoretical and numerical works which call for observational confrontation. In particular, promising predictions that can be tested observationally include signatures of two-point statistics of the velocity field. We here propose to map 11! × 11! In 12CO (2-1), in a homogeneous non-star forming region in the Chamaeleon complex. This will allow us to perform a two-point statistical analysis of the velocity field with a significantly large number of spectra (104), providing a characterization of the structure responsible for the intermittency of turbulence over the parsec scale. The field will be accessible to ALMA hence allowing the observations of the velocity field at very small
scales and high sensitivity.

Tiempo asignado: 20 horas

Propuesta: 2010B-674

Investigador Principal: Monica Rubio

Universidad: Universidad de Chile

Título: Molecular mapping of southern dust cavities

Resumen: Interstellar bubbles reveal the sculpting influences of massive stars' winds and UV photons on the molecular clouds where they are born. We propose to map a southern star-forming region of 12 arcmin in size that has blown several cavities in the surrounding molecular material in the 13CO(2-1) and 12CO(2-1) and a smaller region in the 13CO(3-2) and 12CO(3-2) lines. Spitzer Space Telescope IR images of these relatively nearby features reveal multiple shells and bubbles of varying sizes, and we would use the molecular data to 1) determine kinematic distances to the regions, 2) measure the mass of molecular material associated with each, 3) search for the kinematic signatures of expansion, and 4) measure excitation temperatures and column densities as a function of radius, and 5) compare the molecular conditions of surrounding regions where young stars are forming compared to more quiescent clouds that have not been subjected to the perturbing influences of evolving massive stellar populations. These data would comprise a key piece of a multi-wavelength dataset investigating the evolution of interstellar bubbles and the impacts of stellar feedback.

Tiempo asignado: 25,2 horas

Propuesta: 2010B-677

Investigador Principal: Luis Vega Neme

Universidad: Universidad de Valparaíso

Título: Sub-millimeter signatures of dust in Wolf-Rayet stars

Resumen: We propose to measure the fluxes at 870 μm of recently discovered southern Wolf-Rayet stars. These observations constitute a first step towards the determination of the presence of dust in WR stars through the observations in the sub-mm spectral region, which has not been done before. At those wavelengths condensed dust matter from the circumstellar region, either in single systems or in binary systems, can add to the observed emission on top of the thermal flux emission. As binarity with other massive stars has proven to be responsible for infrared excess from WR stars, our results will thus help us to understand the formation of dust and its relation to the presence of massive companions of WRs.

Tiempo asignado: 2 horas

Propuesta: 2010B-673

Investigador Principal: Luis Vega Neme

Universidad: Universidad de Valparaíso

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Tiempo asignado: 2 horas

Propuesta: 2010B-664B

Investigador Principal: Gaspar Galaz

Universidad: Pontificia Universidad Católica de Chile

Título: The interstellar medium of the Local Volume Legacy Survey galaxies: 3-D molecular gas distribution

Resumen: We propose to map the 12CO(2−1) and 12CO(3−2) emissions with SHFI for one low surface brightness galaxy (NGC0055) from the Local Volume Legacy survey (LVL), for which we already have LABOCA data obtained during 2009B. The LVL is a Spitzer Space Telescope legacy program that surveys a volume-limited region of the local universe out to 11 Mpc, built upon a foundation of UV (GALEX), H!, and HST imaging from 11 HUGS and ANGST surveys. By combining fluxes in 870 μm with those measured with Spitzer we are constraining dust properties like temperature and mass, correlating such measures with the same obtained for the molecular gas, as well as with other features obtained with the wealth of multiwavelength data of the LVL. In particular, we will correlate the dust mass and temperature with those of the molecular gas. The requested telescope time is 24 hours. The remaining telescope time for next semesters, for this programme, depends on results of this proposal, since these data are fundamental to decide whether APEX/LABOCA/SHFI are well suited to study galaxies of LVL with fainter IR fluxes. These data should be clearly complemented in the near future with more powerful CO observations using ALMA.

Tiempo asignado: 12 horas
