Resultados Concurso Apex 2007

Propuesta: CC-07-03

Investigador Principal: Leonardo Bronfman

Título: ATLASGAL: APEX Telescope Large Area Survey of the Galaxy

Resumen: The location of the APEX telescope is ideally suited to observe the inner Galactic disk. With a large field of view of 11 arcmin, and a resolution of 18'' at 870 μm, the new bolometer array LABOCA is the perfect tool to conduct a large scale survey in a limited amount of time. This instrument will allow, both, to resolve sources of 0.1 pc size within 1 kpc, and to map the dust component in the interstellar medium on large scales little explored so far.The ATLASGAL project aims at performing an unbiased survey of the inner Galactic disk. One of the major goals is to reveal objects associated with massive star formation at various stages, to study their timescales and their distribution in the inner Galaxy. Follow-up observations are planned to further study the detected sources.

Tiempo asignado: 10 Horas

Propuesta: CC-07-08

Investigador Principal: Sophia Khan

Título: Constraining the nature of submillimetre galaxies: a LABOCA Science verification study

Resumen: In 1997, a new population of submillimetre galaxies (SMGs) was detected using the SCUBA instru- ment at 850 μm. Follow-up observations constrained these sources to be mainly massive star-forming galaxies at high redshift, whose discovery had not been anticipated by semi-analytical hierarchical mod- els of galaxy formation. However great uncertainties remain over the nature of SMGs, in part due to their optically faint nature and the large beamsize of submm telescopes (making multiwavelength counterpart identification challenging), and the difficulties in constraining the restframe far-IR properties with only one submm datapoint. We propose a science verification study with LABOCA to image a 20'x20' region in the AKARI Deep Field (ADF) to 2mJy (1_). The ADF has the largest number of far-IR–submm colours of any field on the sky, and together with LABOCA imaging, provides the largest catalogue of high redshift bolometrically-selected IR galaxies to-date. The ADF also has deep mid-IR, optical and radio data. Collectively, this will allow us to constrain the nature of SMGs (e.g., dust temperature, IR luminosity and star formation rate), photometric redshifts and AGN/starburst segregation (using mid-IR data, also the most powerful SMG ID technique), the detection of rare objects ($z > 3$, through far-IR dropouts) and constrain the bright end of the

submm source counts. This proposal is funded through FONDECYT (Proyecto # 1070992). The LABOCA data will be used by graduate students from Chile. Note: Chilean members in italics

Tiempo asignado: 27 Horas

Propuesta: CC-07-11

Investigador Principal: Diego Mardones

Título: Structure of Southern Young Massive Dense Cores

Resumen: We propose to use the Laboca Bolometer Array to study the dust distribution in a small sample of isolated massive dense molecular cloud cores. The sources are drawn from a list of 21 southern targets chosen based on their CS molecular line profiles indicative of inward and/or outward motions. The sources are fairly isolated; and have been mapped in 1.2mm continuum (SIMBA) showing an extension of _ 2 – −3 arcmin. Sensitive Laboca observations will allow a precise determination of the radial dust density and temperature distribution of these massive cores. The sensitivity of Laboca combined with the SIMBA observations will allow determination of both the density and temperature laws. This is essential for adequate modeling of molecular line profiles. Moreover, the sensitivity of LABOCA will allow core maps to several core radii, essential for dynamic core modelling.

Tiempo asignado: 12 Horas

Propuesta: CC-07-18

Investigador Principal: Mónica Rubio

Título: MOLECULAR GAS IN THE MAGELLANIC CLOUDS

Resumen: The molecular gas in the Magellanic Clouds is proven to be clumpy and dense as a results of the low shielding from dust and high dissociation of the CO molecule. A consequence of these properties is that the relationship between molecular hydrogen column density and CO intensity is different to that found in Galactic molecular clouds. This difference is clearly seen when comparing the molecular mass derived from virial determination and that from CO luminosity. An alternative way to determine molecular gas mass is the continuum dust emission at 1.2 mm obtained with SIMBA. In this proposal, we propose to map several continuum emission sources detected by SIMBA in the LMC and SMC which were not observed in CO by SEST and do not appear in any of the lower angular resolution surveys. These observations would allow us to determine the properties of these molecular clouds and determine their virial masses which can then be compared to the dust masses determined from the SIMBA observations.

Tiempo asignado: 7 Horas

Propuesta: CC-07-06

Investigador Principal: Paulo Cortés

Título: The Final Wavelength Frontier: Submillimeter Imaging of MUSYC/CDFS and the Search for Submillimeter Galaxies

Resumen: We propose deep APEX-LABOCA imaging of the central 11*0* of the Chandra Deep Field South (CDFS) to a rms noise level of 1 mJy at 870 μm, which we estimate will take a total of 33 hrs. This project is intended to obtain critical knowledge about the emission mechanism of the high redshift Submillimeter galaxy (SMG) population. SMGs exhibit the highest known star formation rates and are therefore indicative of a critical stage of galaxy formation, but the relationship between these SFRs of » 1000M ¯/yr and the AGN feedback that signals the end of rapid star formation in massive galaxies is still uncertain. These questions will be answered using the exquisite multiwavelength coverage of CDFS from Chandra, XMM, GALEX, HST-ACS, Spitzer-IRAC+MIPS, VLA and ATCA to provide SEDs of unprecedented quality for the detected SMGs. We will also study the submillimeter emission properties of galaxy populations detected at other wavelengths by the MUSYC and GOODS collaborations. This proposal is complementary to a wider area but somewhat shallower ESO+MPIfR proposal submitted for the science verification phase of LABOCA. These cutting-edge observations constitute a pathfinder experiment towards ALMA follow-up of sources detected in our LABOCA survey.

Tiempo asignado: 33 Horas

Propuesta: CC-07-05

Investigador Principal: Paulo Cortés

Título: Warm Molecular Gas and Dust in Interacting Galaxies: A key project

Resumen: We are proposing a key project to use the APEX heterodyne and bolometric capabilities, for a long term study of galaxy-galaxy interactions. This key project will start by mapping a selected sample of interacting galaxies, which are at di_erent stages of the galaxy-galaxy interaction process. We request strip-scan observations along the major, minor axis, and interaction regions of the galaxies with APEX-2A in order to map the CO(J = 3 ! 2) line, as well as, to map the dust emission at 870 _m with APEXLABOCA for all the sample galaxies. These observations will allow us to locate where active star formation activity is actually occurring, to determine how this is related to the galaxy-galaxy interaction process at their di_erent stages, to compare the extension CO(J = 3 ! 2) with the cold dust emission, and to study the physical properties of the dust along the galaxy interaction sequence. Finally, these observations will be a path-_nder in the selection of interesting targets for continuing this long term project with ALMA.

Tiempo asignado: 36 horas

Propuesta: CC-07-13

Investigador Principal: Manuel Merello

Título: The temperature of the extremely high-velocity outflow G331.552

Resumen: We propose to undergo a multi-transition study the massive high velocity outflow source G331 in the Norma spiral arm. We detected a striking outflow arising from this massive protostar with velocities spanning close to 200 km/s in CO 7-6. To study the outflow properties of this truly unique source we need a firm determination of the gas temperatures. The goal of this proposal is to detect multiple transitions of SiO and SO in order to derive rotational temperatures and pin down the physical properties of this outflow (mass, column density, momentum). This can be done in 2 hours with the FLASH-460 receiver and 1 hour with APEX-2A.

Tiempo asignado: 3 horas

Propuesta: CC-07-12

Investigador Principal: Jorge May

Título: Massive star formation in the outer Galaxy: dust physical properties in dense molecular cores

Resumen: Provide a summary of the proposed research program and the scientific objectives. We propose to map with LABOCA at APEX, in the submillimeter continuum, 21 regions of massive star formation in the outer Milky Way, at galactocentric radii out to 17 kpc in the III quadrant. These dense cores are detected as point-like sources in the IRAS catalog, with FIR colors of UC H II regions, and in the CS(2-1) transition, a tracer of high gas density. Of these cores, 12 have been mapped in 12CO(3-2) and 13CO(3-2) with APEX and 9 will be mapped soon. From the line data their virial and LTE masses can be estimated. The LABOCA observations will allow determination of dust column densities and, by comparison with the gas column densities, evaluation of the gas-to-dust ratio in the outer Galaxy, which presently is assumed to be the same as for the galactic disk within the solar circle.This first set of submillimeter continuum observations toward a comprehensive sample of massive star forming regions in the outer Milky Way will allow, together with the IRAS fluxes, derivation of their spectral energy densities (SED) and their comparison with those found for massive star forming regions in the inner Galaxy.

Tiempo asignado: 7 horas

Propuesta: CC-07-09

Investigador Principal: Cristian López

Título: The Complete Scenario for massive star formation in the giant molecular cloud NCAR G345.5+1.0

Resumen: We have recently traced, using as probe the 1.2 mm dust continuum emission observed with the SIMBA bolometer at SEST, the distribution of high-mass star forming regions throughout an entire giant molecular cloud (GMC G345.5+1.0), with an extent of roughly 50 pc. We propose here to map with the LABOCA bolometer at APEX the entire giant molecular cloud at 870 μm. These two observations will allow us to determine the opacity dependence with frequency of the warm gas (_ 30 K) towards each of the different regions of massive star formation, which will in turn permit to obtain a better estimate of their masses. In addition, they will allow to asses possible changes in the power law index (_) of the opacity with evolutionary stage of the individual cores. The total time requested is 6 hours within the LST range 14:00 to 20:00 hrs LST. In the southern part of the GMC there are two luminous massive and dense cores associated with high-mass stars that are likely to be in different evolution- ary stages. We propose to map these two cores at 870 μm in more detail in the Science Verification Time. The total time requested in the Science Verification Time is 40 min within the LST range 16:40 to 17:20 hrs LST.

Tiempo asignado: 19 horas

Propuesta: CC-07-14

Investigador Principal: Manuel Merello

Título: The birth of an OB association in the Norma Spiral Arm

Resumen: Provide a summary of the proposed research program and the scientific objectives. The Norma spiral arm in the Southern Galaxy contains the most massive Giant Molecular Clouds as well as the most luminous regions of massive star formation in the Galactic disk. The tangent region of this arm, at an unambiguous distance of □7.5 kpc from the Sun, is ideal to study in detail the process of massive star formation in GMCs. Through observations of the dust continuum at 1.2 mm, using SIMBA at SEST, we discovered the largest and most luminous molecular cloud core identified so far, G331.552, It has a mass of □ 2 × 104 $M_$, a luminosity of 4 × 106 $L_$ and a size of 12 pc. Molecular line observations in the CS(7-6) and 13CO(3-2) transitions, made with ASTE, unveiled several dense molecular condensations as well as a massive and extremely-high velocity molecular outflow towards the brighter of these condensations. Surprisingly, the molecular gas distribution shows a displacement of several arcseconds with respect to the dust continuum emission from the 1.2 mm SIMBA map.

We propose here to map with LABOCA this unique molecular cloud core. The main goal is to determine the spectral index of the mm emission of each of the dust condensations and to investigate possible differences in the derived values, which could be associated to differences in the evolutionary stage of the cores. A further goal is to assess if the displacement between the dust emission and molecular emission is of instrumental or of physical nature

Tiempo asignado: 1 hora