

Resultados Concurso Apex 2008-1

- Lista 1 Propuestas seleccionadas

Propuesta: C-081.F-0015-2008

Investigador Principal: Sophia A. Khan

Título: Constraining the nature of submillimetre galaxies: a LABOCA science verification study pt 2

Resumen: In 1997, a new population of submm galaxies (SMGs) was detected using the SCUBA instrument 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 models of galaxy formation. But great uncertainties remain over the nature of SMGs, partly due to the difficulty in constraining their thermal properties (e.g., LIR) without measurements in other far-IR/submm bands. To overcome this, we have begun a LABOCA survey to search for SMGs in an area with the largest number of far-IR-submm colours of any field on the sky. This is the AKARI Deep Field, in which we have already imaged 20'x20', achieving $\sim 2\text{mJy}$ rms in the central 100 arcmin², but poor weather and the substantially higher than expected LABOCA overhead have prevented us reaching our originally-planned (area-depth) coverage. We propose additional LABOCA imaging of our region using only this shortfall in time (13hrs). The expected improvement in coverage will increase the number of SMGs to match the original proposal, significantly aiding the original science objectives (notably, constraining the 870 μm source counts in a crucial flux range and the search for rare $z > 3$ SMGs).

Tiempo asignado: 13 horas

Propuesta: C-081.F-0003-2008

Investigador Principal: Simon Casassus

Título: The mm-wave continuum in PNe

Resumen: Planetary nebulae (PNe), with the relatively simple geometries of compared to other photo-ionised nebulae, are test laboratories for nebular astrophysics. Their radio (<300 GHz) spectra are paradigmatically interpreted as free-free continuum. Yet we have collected evidence, through a CBI and SIMBA survey of the 31 and 250 GHz continuum in 22 objects, that $51 \pm 11\%$ of the cm-wave continuum (<31 GHz) is not due to free-free emission. This finding confronts the free-free paradigm in this important class of objects, with dramatic consequences on the inferred physical conditions and abundances. We have selected the best candidates for an exhaustive continuum study. APEX+LABOCA can test our claims, and provide a new data point at 345 GHz, which is crucial to constrain the sub-mm Rayleigh-Jeans tail from nebular dust.

Tiempo asignado: 8 horas

Propuesta: C-081.F-0012-2008

Investigador Principal: Guido Garay

Título: Complex Organic Molecules in Outflows

Resumen: Outflow shocks can heat the surrounding medium, triggering different processes not present in the quiescent gas. These processes can release molecules trapped in the grains into the gas phase. Outflows can therefore modify the chemical composition of the circumstellar envelope, and it remains an unanswered question whether complex organic molecules can be formed in the envelope through these shock-triggered reactions. Here we propose to perform deep searches for complex organic molecules (i.e., HCOOH, HCOOCH₃, CH₃CHO, CH₃OCH₃) in an outflow driven shock in order to: 1) study the the chemical impact of outflows on their surroundings; 2) investigate how common is it for outflows to trigger hot corino-like (complex molecule) chemistry in low-mass protostars; and 3) constrain shock chemistry models.

Tiempo asignado: 18 horas

Propuesta: C-081.F-0006-2008

Investigador Principal: Andres Guzman

Título: Search for collimated outows towards high-mass YSOs with suspected jets.

Resumen: One of the key problems in the field of star formation is to test if the formation paradigm for low-mass stars, with the presence of an accreting disk and a collimated outow, extends to high-mass protostars. We propose to undertake multi-frequency APEX observations in search for collimated outows towards a sample of fifty young and luminous massive star forming regions with radio continuum emission much weaker than that expected from their measured IRAS luminosity. These are likely young high-mass objects in the pre-UCHII phase, where the weak radio continuum emission is most likely due to the jet phenomena. We request to observe the first 20 sources in our sample in 2008A. Based on the outow statistics from massive stars we expect to obtain at least $\sim 1 - 2$ collimated outows associated with an O-star

Tiempo asignado: 12 horas

Propuesta: C-081.F-0010-2008

Investigador Principal: Diego Mardones

Título: Study of the gas evolution in proto-planetary disks

Resumen: We propose to carry out observations in CO(3-2), HCO+(4-3) and DCO+(4-3) in a sample of 19 isolated HAeBe and Vega-type stars with disks in different evolutionary stages to study the evolution of the gaseous component of their protoplanetary disks. In those sources where molecules are highly depleted, we expect an enhancement of the deuterated molecule DCO+ that allows us to detect the gas component at the midplane of the disks. In addition, with these observations we will derive information about kinematics, temperature, column density, size and inclination of the disks, as well as level of depletion and deuteration fraction [D]/[H]. This would be the first survey of this type in the southern hemisphere. These kind of surveys are important as a complement of future Herschel observations, as well as to provide good candidates for future ALMA projects.

Tiempo asignado: 19 horas

Propuesta: C-081.F-0017-2008

Investigador Principal: Rodrigo Parra

Título: Hydrogen Recombination lines at mm and sub-mm Wavelengths in Nearby Bright Galaxies

Resumen: Radio, mm and sub-mm hydrogen recombination lines probe compact regions of intense star formation activity. The interpretation of the observed relative line strengths can provide us with a wealth of information about the physical conditions in the ionized regions around recently formed massive stars. Since recombination lines are expected to be stronger at higher frequencies, we propose heterodyne APEX observations of these lines towards a sample of 6 galaxies having strong low frequency detections. Since these higher frequencies recombination lines are expected to arise from thermal gas, the results of these observations (either detection or non-detection of the lines) will establish new constrains for the existing LTE models. Possible trends with host galaxy optical class and radio-continuum data can also be explored. These observations can eventually find interesting targets to be followed up with ALMA.

Tiempo asignado: 7 horas

Propuesta: C-081.F-0021-2008

Investigador Principal: Diego Mardones

Título: The effect of protostellar outflows in young clusters

Resumen: Protostellar outflows inject momentum and energy into the cloud, disperse the surrounding gas, may feed turbulent motions, and perhaps trigger star formation. Clearly, understanding the details of the interactions between multiple outflows in a young cluster and their natal cloud is important for studying molecular cloud evolution and the star formation process. Here, we propose to map the CO(3-2) from the inner 5×5 region of the recently discovered Serpens South cluster, a very young and dense cluster of protostars. We will search for molecular outflows, measure their energetics and study their impact on the cloud. The proposed observations are part of a new survey to study the impact of protostellar outflows in clusters at different evolutionary stages.

Tiempo asignado: 6 horas

Propuesta: C-081.F-0019-2008

Investigador Principal: Paulo Cortes

Título: Constraining the magnetic field 3D morphology in the massive star forming regions: G30.79 FIR 10 and G34.4

Resumen: We propose to study the magnetic field in the massive star forming regions G30.79 FIR 10 and G34.4 by using a multi-line approach with the APEX telescope. In recent published works, both sources have been mapped in polarized dust and line emission in order to study the magnetic field morphology and also to estimate its strength. However, such observations give only information about the morphology of the magnetic field on the plane of the sky. On the other hand and by using ion-to-neutral molecular line width ratio measurements, it has been shown that the orientation of the magnetic field, respect to the line of sight, can be determined in the weakly ionized parts of molecular clouds. Combining this new technique with our acquired knowledge of the magnetic field in this region, we can constrain the three-dimensional morphology of the field toward these sources, which will be of uttermost importance to understand its role in the star formation process. Additionally, we proposed to map these sources with LABOCA in order to constrain the SED and physical properties of dust in these regions.

Tiempo asignado: 10.5 horas

- [Lista 2 Propuestas en lista de espera](#)

Propuesta: C-081.F-0009-2008

Investigador Principal: Sophia Khan

Título: Sub-mm observation of high-redshift active proto-clusters.

Resumen: Current Λ -CDM models predict that massive galaxies ($M_{\text{stars}} > 10^{11} M_{\odot}$) assemble within large dark matter haloes, earlier and quicker than less massive ones, and by means of short-lived, intense bursts of star formation. High-redshift, clustered, powerful starburst galaxies ($\text{SFR} > 100 M_{\odot}/\text{yr}$) are the best candidate progenitors of massive galaxies forming in distant protoclusters. This idea can be tested by a search for highly obscured star formation in $z > 2$ galaxy overdensities, in order to understand the epoch and rate of major formation/assembly of these class of sources, and discriminate between different models. Therefore, we propose a pilot program aimed to perform LABOCA 870 μm observations of one high-redshift ($z > 1.8$) overdensity of starburst galaxies in the ELAIS-S1 SWIRE field (selected over an area of 5 deg^2 in total), identified on the basis of their Spitzer-IRAC colors and MIPS 24 μm fluxes.

Tiempo asignado: 30 horas

Propuesta: C-081.F-0002-2008

Investigador Principal: Leonardo Bronfman

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

Resumen: We propose to use APEX/LABOCA to map the inner Galactic Plane at 870 μm to achieve the first Galaxywide continuum survey at submillimeter wavelength. Dust continuum emission in the (sub)millimeter range is the best tracer of the earliest phases of (high-mass) star formation since it is directly probing the material from which the stars form. Only a large unbiased survey can provide the statistical base to study the scarce and short-living protostars or protoclusters at the origin of the massive stars and the richest clusters in the Galaxy. LABOCA can image more than 500 deg^2 down to 50 mJy rms with only 400 hrs of observing time. Cross-correlation with already available galactic surveys such as GLIMPSE, MIPS GAL, VLA-NVSS, and with similar surveys planned with Herschel will considerably help to answer a wide range of questions including: (1) What are the properties of the cold phase of massive star-formation? (2) What is the evolutionary sequence for high-mass stars? (3) How important is triggering to form new generations of high-mass stars? (4) What are the earliest phases of the richest clusters of the Galaxy? ATLASGAL will have a high legacy value by revealing, in an unbiased way, hundreds of star-forming regions throughout the Galaxy. It will act as a true pathfinder for ALMA by providing large, statistically well founded samples of high-mass protostars and protoclusters.

Tiempo asignado: 15 horas

Propuesta: C-081.F-0018-2008

Investigador Principal: Paulo Cortes

Título: Mapping Warm Gas and Dust Emission from the Coalsack

Resumen: We propose to map dust, at 870 μm , and to perform a multi-line study of molecular emission, at the 230 GHz and 345 GHz bands, from the Coalsack molecular cloud towards the globule 2 and the southern globule, by using the LABOCA bolometer and SHFI facility receiver from the APEX telescope. For these observations we are requesting 22 hours of total time. The Coalsack cloud has not been mapped in dust emission before and has been poorly studied in molecular line emission. These observations will allow us to expand our understanding about the possible origins of the cloud as well as to understand why, when compared to similar objects, the Coalsack has not produced any stars so far. By studying the physical properties of dust and gas we will be able to test predictions from chemical and dynamical models proposed for this object. Additionally, these observations will provide us with interesting targets to be studied in the future with ALMA

Tiempo asignado: 8 horas

Propuesta: C-081.F-0001-2008

Investigador Principal: O. Vaduvescu

Título: Massive Star Forming Galaxies in the COSMOS Field

Resumen: We request 14 hours plus overhead of LABOCA time to image a 25X25 arcmin² part of the 2 deg² Cosmic Evolution Survey (COSMOS) field to a sensitivity level comparable to that of our MAMBO 1.2 mm map of this same field, i.e., 3 mJy rms noise at 870 μm . Our aim is to (1) characterise the spectral energy distribution of the 26 high significance MAMBO sources in the field to derive accurate photometric redshifts and in particular resolve the temperature-dust emissivity degeneracy, (2) validate the lower significance MAMBO detections, (3) perform a cross-correlation with our 2 mm APEX-Sunyaev-Zel'dovich cluster survey (APEX-SZ) data to assess the contribution of submm galaxies to the SZ signal, and (4) establish a strong Chilean involvement in a planned survey of the entire COSMOS field.

Tiempo asignado: 26 horas

- **Lista 3 Propuestas que serán observadas si hay disponibilidad**

Propuesta: C-081.F-0007-2008

Investigador Principal: Gaspar Galaz

Título: Molecular gas and dust in nearby low surface brightness galaxies

Resumen: Low surface brightness galaxies (LSBs) dominate the galaxy number density in the universe. Their internal dynamics is driven by large amounts of dark matter, which imply that knowing their origin, properties and evolution is fundamental. Even though many properties have been elucidated during the last ten years, there are still many pending issues related to the interstellar medium (ISM) of LSBs, in particular, about the gas and dust physical conditions like temperature and density preventing LSBs from forming stars, or allowing only low stellar formation rates. In this regard, we propose to use APEX (SHFI and LABOCA) to detect molecular gas and to map the dust distribution in 5 LSBs, two of them with already detected 12CO(3–2). For these two galaxies we will use SHFI to detect 12CO(2–1), and then correlate such an emission with the 12CO(3–2) emission already detected. The sample of galaxies is from Galaz et al. (2006) and Pizzella et al. (2005). Considering an expected noise of 5 mK in 12CO(3–2) and 12CO(2–1), and 10 mJy for LABOCA observations, we estimate that we require a total of 15 hours with SHFI and 15 hours with LABOCA. Therefore we need a total of 30 hours observing time.

Tiempo asignado: 30 horas

Propuesta: C-081.F-0011-2008

Investigador Principal: Sophia Khan

Título: From stars to planets: constraining the origins of planetary systems through 870 μm debris disk emission

Resumen: We propose 870 μm LABOCA imaging of a sample of bright stellar targets recently detected as having 9 and 18 μm excesses in our AKARI IR Debris Disk (DDs) Survey. We wish to prove that these contain cold (10–20K), dusty circumstellar debris disks, and to measure their densities and masses. It is already known that some main-sequence stars are surrounded by dusty debris disks which are fed through asteroid and comet collisions. This is the base material (silicates, carbonaceous and icy grains) out of which planets are formed. The LABOCA submillimetre imaging will directly trace this cold dust component, providing key information on the temperature, mass and density of the material where giant planet formation occurs. Few objects like this have been studied at submm wavelengths, although it must be a relatively common phase in the planet formation process. The LABOCA submillimetre observations will provide us with the best quantitative constraints available on the dust temperature of the target sources, and will allow us to infer their masses and densities, providing a new insight to the process that links stars to planets, and to our own cosmic origins.

Tiempo asignado: 30 horas

Propuesta: C-081.F-0005-2008

Investigador Principal: J. R. Cortés

Título: Dust properties of the star-forming and most isolated galaxy of the Local Universe: the dwarf galaxy CIG 121

Resumen: Dust in dwarf galaxies is of particular interest because these systems resemble those in the early universe. We propose to observe the sub-mm continuum emission in the dwarf galaxy CIG 121 to study the properties of its cold dust, which is essential to model the dust properties (e.g; temperature, mass) in this kind of galaxies. Environmental contamination of its properties is fully minimized and thus its properties must be intrinsic since it is known as the most isolated dwarf galaxy. From our own observations or the archive, a multiwavelength collection of image/data cube is available. With the LABOCA mapping at 850 μ m we will determine the distribution of the cold dust component, analyze the SED through the galaxy (cm to optical range) and obtain the physical properties of the dust by fitting a physical model. The dust properties will be compared with the others ISM-star forming tracers: gas-to-dust ratio, metallicity/dust distribution, hot/cold dust distribution.

Tiempo asignado: 16 horas