Resultados Concurso Apex 2009-A

Propuestas seleccionadas

Propuesta: 2009A-155

Investigador Principal: Leonardo Bronfman

Universidad: Universidad de Chile

Título: ATLASGAL - The APEX Telescope Large Area Survey of the Galaxy 2.

Resumen: We propose to use APEX/LABOCA to continue mapping the inner Galactic Plane at 870 _m to achieve the _rst Galaxy-wide 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 cold material from which the stars form. Only a large unbiased survey can provide the statistical base to study the scarce and short-lived protostars and protoclusters in the Galaxy. LABOCA can image more than 500 deg2 down to 50 mJy rms with only 400 hrs of observing time. Cross-correlation with already available galactic surveys such as GLIMPSE, MIPSGAL, VLA-NVSS, and with similar surveys planned with Herschel and NANTEN2, 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 act as a true path_nder for ALMA by providing large samples of high-mass protostars and protoclusters.

Tiempo asignado: 15 horas

Propuesta: 2009A- 198

Investigador Principal: Paulo Cortes

Universidad: Pontificia Universidad Católica de Chile

Título: Cosmological Nucleosynthesis: The Lithium Problem.

Resumen: This project was already awarded with 18 hours for the 2008b period. However and due to the noncommissioned status of the APEX SHFI-T2 receiver, the project was not executed. Therefore, we World like the APEX committee to take this issue into consideration when reviewing this proposal. A measure of the primordial lithium abundance provides significant observational constraints on current models of big-bang nucleosynthesis (BBN), including the confrontation between BBN models and the observed cosmic microwave background anisotropy measurements, and dark matter particle physics in the early universe. Current optical measurements of halo star lithium abundances are subject to significant systematic uncertainties. APEX, however, allows observations of sub-millimeter LiH rotational transitions, providing an important alternative approach to the lithium problem. Because, the lowest LiH rotacional transition, (J = 1 –0) at 443 GHz is heavily absorbed in the atmosphere, it has only been searched for in red-shifted extragalactic absorption (Combes & Wiklind 1998), making a clear detection difficult. However, the new APEX receivers allow a search for the (J = 2 – 1) and (J = 3 – 2) transitions near 861 GHz and 1.3 THz in the local ISM directly. We propose here, to search for these LiH transitions in both isotopomers toward high-density molecular clouds in Orion. If detected, this will provide an important estimate of galactic

LiH abundance, and help to answer one of the important cosmological questions regarding primordial nucleosynthesis.

Tiempo asignado: 18 horas

Propuesta: 2009A- 162

Investigador Principal: Matthias R. Schreiber

Universidad: Universidad de Valparaíso

Título: Understanding Transition Circumstellar Disks: disk masses

Resumen: Circumstellar disks around Pre-Main-Sequence (PMS) stars are the sites of planet formation. Spectacular candidates for disks perhaps presently forming planets are so-called transition disk systems with their optically thin inner disks and optically tic outer disks. However, several mechanisms have been proposed to explain the inner opacity holes, i.e. planet formation, grain growth, photoevaporation, tidal truncation in close binaries, and their relative importance is currently completely unconstrained. These mechanisms, all very relevant to disk evolution, can be distinguished when disk masses, accretion rates and multiplicity information are available. This proposal is part of a large coordinated program aiming to collect information of newly discovered transition disks in order to (i) establish the relative importance of the mechanisms potentially responsible for their inner holes and (ii) identify systems with strong evidence for ongoing planet formation to be followed-up with Herschel and ALMA. Here we propose to perform Apex/LABOCA observations to derive constraints on the masses of 25 Southern transition disk objects.

Tiempo asignado: 8 horas

Propuesta: 2009A-196

Investigador Principal: Diego Mardones

Universidad: Universidad de Chile

Título: A 450 μm Imaging Survey of the Massive Cores with P-ArT´eMiS

Resumen: We propose to carry out P-ArTeMiS observations at 450 μm of 20 massive protostellar clumps detected by SIMBA at 1.2 mm. Half of the targets are located in the high-mass star-forming complex RCW 106, and the other half are more isolated cores with similar physical properties. Together, this sample will enable us to constrain the bolometric luminosity, and mass of individual star-forming cores in a variety of environments. Combined with previous data, we will be able to simultaneously study the radial distribution of density and temperature within these cores, which is essential to model the massive star formation kinematics. At this short wavelength, we will be able to probe into the highest density and temperature regions essential to adequately model massive star forming cores. In 2010 we will be able to followup with even higher frequency observations using the final ArTeMiS camera (200 μm, 350 μm, and 450 μm). This is only possible at the extremely high elevations of Chajnantor or from space.

Tiempo asignado: 20 horas

Propuesta: 2009A- 179

Investigador Principal: A. Guzman

Universidad: Universidad de Chile

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

Resumen: One of the key problems in the _eld 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. Last year we started a long term APEX project in search for collimated outows towards a sample of _fty 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. During 2008-A we observed nine objects and detected outow emission in seven of them. Among them is the luminous object G345.49, which the ATCA observations show is associated with a triple radio source consisting of a jet and two outer lobes. This semester we propose to observe 12 sources in our sample, nine of which have been already observed at radio continuum wavelenghts with ATCA. The main goal of the APEX observations is to to determine the energetics, momentum and mass ux of the molecular outow which together with the ATCA observations of the ionized jets will allow to investigate the link between these two phenomena.

Tiempo asignado: 12 Horas

Propuesta: 2009A-191

Investigador Principal: J. R. Cortés

Universidad: Universidad de Chile

Título: Warm Molecular Gas and Dust in Interacting Galaxies.

Resumen: Here we propose observations to conclude the current stage of our long term project, Warm Molecular Gas and Dust in Interacting Galaxies. This project started by mapping a selected sample of interacting galaxies, which are at different stages of the interaction process. We are requesting strip-scan observations along the major, minor axis, and interaction regions in our sample with APEX-SHFI in order to map the CO(J = 3 ! 2) line, as well as to map the dust emission at 870 μm with APEX-LABOCA for the un-observed galaxies in our sample. So far, we have obtain unique an invaluable data on many of our sources, but only the complete sample will allow us to locate where active star formation activity is occurring at the different stages of the interaction. Also by comparing the extension CO(J = 3 ! 2) with the cold dust emission, we will improve our understanding about the dynamics of the densde molecular gas. Finally, these observations will be a path-finder in the selection of interesting targets for continuing this long term project with ALMA.

Tiempo asignado: 6 horas

Propuesta: 2009A-190

Investigador Principal: Gaspar Galaz

Universidad: P. Universidad Católica de Chile

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

Resumen: Low surface brightness galaxies (LSBs) dominate the galaxy number density in the universe, and their internal dynamics is driven by large amounts of dark matter. Thus, the understanding of their origin, properties and evolution is fundamental to complete the puzzle of galaxy formation and evolution. There are still many pending issues, like the physical characterization of the dust and gas of LSBs. Are these conditions preventing LSBs from forming stars or allowing only low star formation rates? In this regard, we propose to observe (1) the $_{12}$CO(2−1) and $_{12}$CO(3−2) molecular transitions (APEX-1 and APEX-2) in 3 LSBs with a wealth of optical data from Pizzella et al. (2008), and (2) the dust emission at 350 μm (SABOCA) in NGC0521, with already measured fluxes at 870 μm with LABOCA and at 100 μm with IRAS. With the two CO line ratio we will characterize the CO density and temperature for the 3 selected LSBs, and with the bolometric observations plus IRAS data, we will characterize the dust model and dust temperature for NGC0521. We request a total of 26.5 hours to carry on this program.

Tiempo asignado: 22,5 horas

Propuesta: 2009A-187

Investigador Principal: Simon Casassus

Universidad: Universidad de Chile

Título: A CO Survey in Planet-Forming Disks: Characterizing Gas Content in the Epoch of Planet Formation

Resumen: Understanding the evolution of circumstellar gas around late pre-main sequence objects and its link to the planet formation process remains one of the key unanswered problems in astrophysics. The late pre-main sequence evolution of circumstellar gas and its influence on planet formation has not been characterised. Additionally, only a few gas-rich systems in the transition from protoplanetary to main sequence (MS) phases are known. We propose to carry out an APEX $_{12}$CO(3-2) 345 GHz survey of dusty circumstellar disks in a well defined sample of southern dusty young stars. Our immediate objectives are 1) to characterize the evolution of the molecular gas and dust in protoplanetary disks systems through the ratio of infrared exceso and integrated CO emission, 2) to identify new gas-rich systems and build up a southern sample of gaseous protoplanetary disks that can be targeted with ALMA, and 3) to extract statistics on the physical conditions inferred in the disks through radiative transfer models of the CO line profiles. A long term objective of this programme is to resolve the physico-chemical structure of the protoplanetary disks with ALMA, and search
for the predicted signatures of planet formation.

Tiempo asignado: 16 horas

Propuesta: 2009A-201

Investigador Principal: P.Aguirre

Universidad: Pontificia Universidad Católica de Chile.

Título: Submillimetre Mapping of a Massive Galaxy Cluster

Resumen: We propose to obtain deep LABOCA mapping of the rich galaxy cluster SCSO J233430.2-543647.5, in order to detect faint background submillimeter sources, down to a flux limit of 1.9 mJy/beam. The proposed target was optically detected by the Southern Cosmology Survey, and we have selected it for submm mapping based on the availability of high-quality multiwavelength data, and on the combination of high mass and lensingideal redshift. In this way, we will be able to detect faint SMGs by exploiting the effects of gravitacional magnification, to accurately measure their flux densities and to study the properties of the population of dusty galaxies that most likely dominates the background IR/submm light. Additionally, this will contribute to the urgently needed formation of large samples of high redshift star-forming galaxies in the southern hemisphere, which will be high priority targets when ALMA starts early science and allows the deepest probe ever of these complex and active massive, dust obscured systems.

Tiempo asignado: 28 horas

Propuesta: 2009A-195

Investigador Principal: Diego Mardones

Universidad: Universidad de Chile

Título: Infall and Outflow Evolution in Star-Forming Cores

Resumen: Protostars form as a consequence of the gravitational contraction of dense gas in cores, and it is this dense gas that serves as the primary mass reservoir of a forming star. The inward and outward motions of the circumstellar material have an impact on the final mass of the star, and thus it is of extreme importance to study the infall and outflow of material in cores in order to fully understand star formation from beginning to end. Here we propose to continue the observations of a sample of cores at different evolutionary stages in order to study the evolution of the dense gas infall and outflow motions, their effect on the core and the mass-assembling process. (A large sample of cores at different ages is needed in order to produce statistically sound results.) Different molecular lines which trace the core column density, the dense outflow and the infall motions will be observed. We will also use publicly available multi-wavelength continuum data and radiative transfer models to characterize the observed cores. The combination of the kinematical information from the APEX spectral observations and the information from the continuum data will allow us to conduct an unprecedented study of the evolution of cores in low-mass star forming regions.

Tiempo asignado: 25 horas

Propuesta: 2009A-184

Investigador Principal: Leonardo Vanzi

Universidad: Pontificia Universidad Católica de Chile

Título: Studying the dust in low-metallicity galaxies: 450 _m imaging with P-Artemis.

Resumen: The mid-infrared (MIR) to submillimeter (Submm) spectral energy distribution (SED) of galaxies is an extremely important tool to access such essential information as a galaxy's star formation rate or the con-tribution of an active galactic nucleus. However to derive this information, one must understand how the properties of the interstellar medium and the distribution of dust in di_erent phases a_ect the SED. To this aim we are currently modelling the MIR/Submm SEDs of dwarf galaxies and individual star-forming regions using IRAS, Spitzer and LABOCA. This class of sources is selected because it approximates best the _rst evolutionary phases of galaxies that can only be observed with broad-band SEDs. This modelling has already revealed puzzles, such as large reservoirs of cold dust, and demonstrated the necessity of a dense coverage of the SED near its peak, i.e. in the submm. In particular, the 450 _m band is crucial to resolve ambiguities on the dust temperature leading to large uncertainties in the derived dust mass. We are thus proposing observations with P-ArT_eMiS, a 16 _ 16-pixel prototype of ArT_eMiS, a large-format bolometer camera of 5760 pixels being built by CEA, to operate at 450 _m, 350 _m and 200 _m on APEX.

Tiempo asignado: 12 horas
