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FROM THE DIRECTOR

Dear SMA Newsletter readers,

We have made substantial changes to our newsletter, which we hope improve the product that we offer to you. Please note that details regarding our call for proposals for the November 2011-May 2012 period are now included in the Other News section.

Since the last issue, two major developments have occurred that will enable us to maintain strong leadership in both submillimeter astronomy and instrument development. Firstly, I am happy to announce that the long-standing and fruitful partnership between the SAO and ASIAA, established with the construction and operation of the SMA on Mauna Kea, Hawaii, will continue well into the future as both partners have recently agreed to support the development and operation of the SMA for an additional fifteen years. This extension comes at an exciting time for submillimeter astronomy with the numerous successes of the Herschel satellite and pending Cycle 0 observations at ALMA; and is due in large part to the continued high oversubscription rate, solid publication record, and expanded user base reflected by observations made towards non-traditional submillimeter targets: GRB's and supernovae, for example, and demonstrates the SMA partner institutes desire to invest in the future. Secondly, the Smithsonian Astrophysical Observatory, in collaboration with ASIAA, was recently selected by the NSF as the recipient of the 12-meter diameter US prototype ALMA antenna. This antenna was built to the high standards required of submilimeter interferometry; and will be used as part of a network of telescopes for mm wavelength VLBI, for single dish submillimeter observations, and as a platform to support submillimeter instrument development for astronomy. Indeed, work has already begun at the VLA site in New Mexico to bring this antenna back on line in order to verify and improve performance.

Finally, we hope that you enjoy the new format and the information provided to you in our latest newsletter.

Ray Blundell

FAINT SUBMILLIMETER SOURCES BEHIND MASSIVE LENSING CLUSTERS

Chian-Chou Chen, Lennox L. Cowie

The integrated light from sources outside our Milky Way galaxy—the extragalactic background light (EBL)—can be used to place constraints on the cosmic star formation history (e.g., Lagache et al. 2005) We now know that there is a comparable amount of light absorbed by dust and re-radiated in the far-infrared as there is emitted in the optical/UV (Puget et al., 1996; Fixsen et al., 1998) Thus, to fully map the star formation history, it is necessary to include the star formation that is hidden by dust.

Blank-field surveys with ground-based single-dish telescopes, such as the 15 m James Clerk Maxwell Telescope (JCMT), have resolved 20%–30% of the 850 μm EBL into distinct, bright submillimeter galaxies (SMGs) with $S_{850\,\mu m} > 2$ mJy (e.g., Barger et al. 1998, 1999; Hughes et al. 1998; Eales et al. 1999, 2003; Coppin et al. 2006) However, the poor resolution (e.g., ~15″ FWHM on the JCMT at 850 μm) makes locating the true counterparts at other wavelengths difficult, thereby limiting our knowledge of the nature of the individual SMGs.

Although it is not possible to do surveys to find new SMGs with radio and submillimeter (submm) interferometry, their subarcsecond resolution has proved invaluable for reducing the positional error of single-dish detected bright SMGs and identifying counterparts. We now know that bright SMGs are like local ultraluminous infrared galaxies (ULIRGs; $L_{IR} > 10^{12}\,L_{\odot}$): they are gas rich (Tacconi et al., 2008), most appear to be mergers (Engel et al., 2010), and the dominant power source is star formation, although a large fraction of them do contain active galactic nuclei (AGNs) (Alexander et al., 2005). However, they lie at higher redshifts ($z = 1 - 5$; Chapman et al. 2005; Daddi et al. 2009b) and make a significant contribution to the high-redshift stellar assembly (Barger et al., 2000).

In addition to reducing the positional uncertainties, submm interferometric studies of bright SMGs have shown that such high-resolution submm imaging is critical for other reasons. First, that is how some of the first spectroscopically confirmed, high-redshift ($z > 4$), bright SMGs were discovered (e.g., Wang et al. 2007; Daddi et al. 2009a) Their existence confirms that relying on the radio selection technique — a popular technique to pinpoint the counterparts to bright SMGs by making use of the well-known correlation between far-infrared and radio luminosities — is biased against submm faint/high-redshift sources because the radio flux density drops faster than the submm due to the *K*-correction.

Second, the multiplicity of bright SMGs has turned out to be unexpectedly common. Several groups have reported that single, bright SMGs resolve into two and sometimes even three SMGs, yet various selection techniques at other wavelengths usually do not identify the same number of counterparts (Younger et al., 2009; Wang et al., 2011). Based on current number counts, Wang et al. (2011) predict that ALMA observations of bright SMGs will detect multiple systems (including double and triple systems) with 850 μm fluxes above 0.5 mJy around 35% of the time. The fact that bright SMGs are likely to be mergers and clustered may enhance this probability. Such multiplicity can potentially increase the number counts at the low luminosity end and may also fundamentally change the luminosity function of SMGs.

Lastly, Younger et al. (2007, 2009) showed that 3 out of 16 (~20%) SMA-detected, bright SMGs in a non-preselected survey do not have any counterparts at all at other wavelengths. Such sources, which are potentially at very high redshifts, extremely dusty, and almost impossible to detect at other wavelengths, have also been found by Chen et al. (2011)

The above issues not only pose challenges regarding the robustness of indirect studies through selections at other wavelengths, but they also strengthen the need for direct submm high-resolution imaging of SMGs using interferometry. Besides, as mentioned above, this bright SMG population currently under such heavy investigation only constitutes 20%–30% of the 850 μm EBL. Therefore to fully understand the role of SMGs in cosmic star formation, studies with submm high-resolution imaging need to be conducted on fainter and more typical SMGs that produce the bulk of the 850 μm EBL.

However, detecting faint SMGs is difficult because of the confusion limit—the smallest noise level that single-dish submillimeter telescopes can reach due to their limited resolution (e.g., the confusion limit is ~2 mJy on the JCMT). Various methods have been developed to work around this problem.

One approach is to find a population of galaxies at an other wavelength that best represents the faint SMGs by searching for a stacked submm signal measured at the positions of a selected population. Once such a population is found, the properties of the faint SMGs can be inferred. Results from this statistical approach show that infrared selected galaxy samples can contribute another ~20%–30% of the 850 μm EBL. However, depending on the wavelength used and the selection methods employed, the redshift distribution can be quite different, varying from a large fraction of the contributing population being at $z < 1.5$ (Wang et al., 2006; Serjeant et al., 2008) to the light coming exclusively from sources at $z > 1.3$ (Dye et al., 2006). This difference could be due to sources with different properties, such as luminosity and mass, being sampled in the different selections. Regardless, stacking analyses have the disadvantage in that they reveal nothing about individual sources and only give us a general idea of the nature of this population.

Another approach that allows the direct detection of faint SMGs is to observe with single-dish telescopes the fields of massive lensing clusters. Due to the presence of the intervening cluster mass, the intrinsically faint fluxes of background sources are gravitationally amplified to a detectable level and the confusion limit is reduced by the expansion of the source plane. Around 20 faint SMGs with fluxes between 0.1 and 2 mJy have been detected in this way, and they contribute more than 50% of the 850 μm EBL (Cowie et al., 2002; Smail et al., 2002; Knudsen et al., 2008). It is this dominant and unbiased population that needs to be carefully investigated. As with the bright SMGs, pinning down the positions of these sources is the first and most crucial step.

Several groups of astronomers have started direct high resolution submm imaging on faint SMGs discovered from single-dish surveys on regions of massive lensing clusters. So far only 3 of them have been studied using the SMA and the results are interesting, though far from conclusive (Knudsen et al., 2009, 2010; Chen et al., 2011).

Firstly, the redshift distribution is diverse from z of 1 to potentially greater than 6. This nature of broad red shift distribution on faint SMGs has been inferred from stacking analysis as well as predicted by a physical based model that is able to reproduce bright SMG number counts (Granato et al., 2004).

Secondly, one out of three (33%) faint SMGs has no counterpart in other wavelengths *(Figure 1)*. It is not that surprising because if faint SMGs are small versions of bright SMGs with a broader redshift distribution, then the chances of finding faint SMGs without

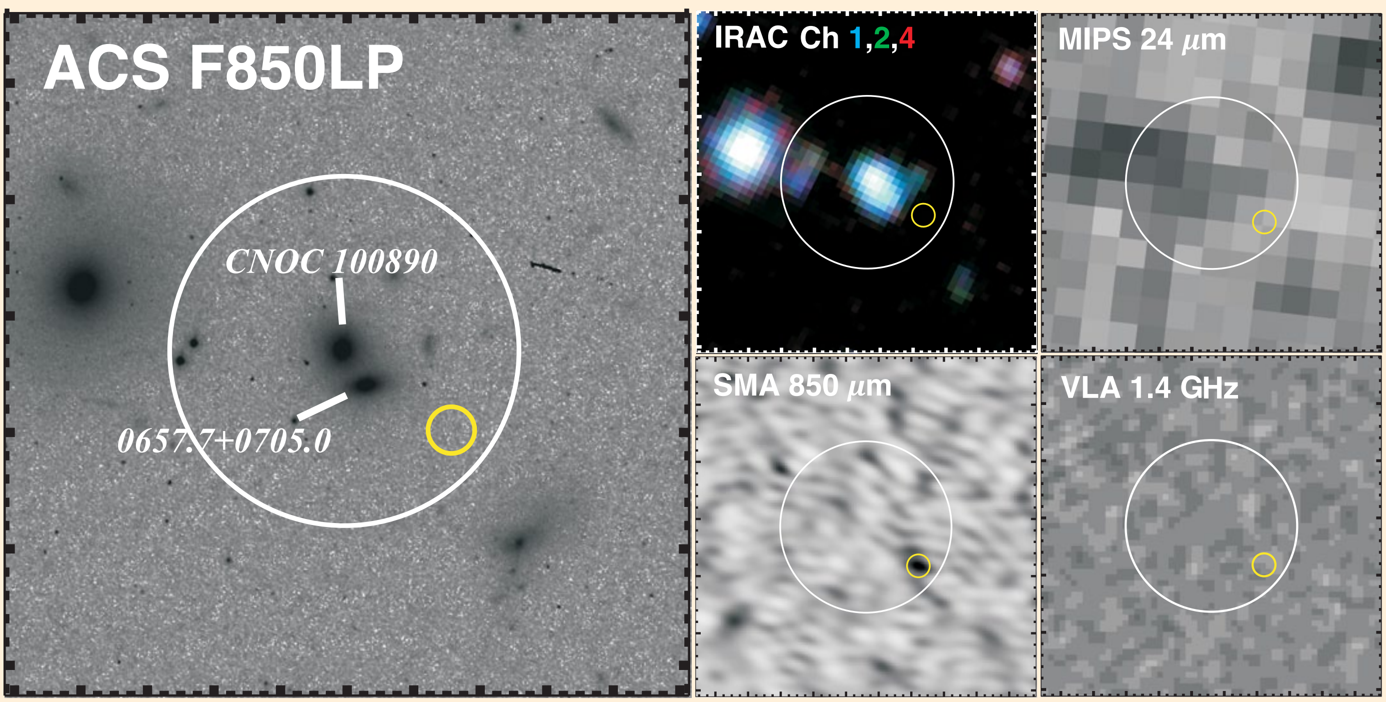

Figure 1: Multiwavelength images of A2390-3. North is up and East is to the left. The size of each image is 30″ x 30″. The big white circle in each image is centered at the peak SCUBA position and represents the SCUBA beam size (15″ x 15″) on the JCMT. The SMA position of A2390-3 is labeled in each image with a 2″ diameter yellow circle. The gray scale images have inverse scales. Three of the IRAC channels (1, 2, and 4), corresponding to 3.6 μm , 4.5 μm , and 8.0 μm, are presented in the combined IRAC image with the color codes labeled.

any counter parts at other wavelengths could be higher than 20% found in studies of bright SMGs (Younger et al., 2007, 2009).

In addition, submm high-resolution imaging on faint SMGs is even more essential than that of bright SMGs.

As a result of the poor resolution of single-dish telescopes, the amplifications of highly amplified sources are not well determined. This causes great uncertainty in the intrinsic fluxes. After obtaining an accurate position for SMG A2390-3 from their SMA observations, Chen et al. (2011) found that t his source, which had been thought to be highly amplified by a factor of 52, was only amplified by a factor of 2.5. Such differences in t he de-lensed fluxes due to inaccurate positions can easily be an order of magnitude. Thus, for 850 μm fluxes between 0.1 mJy and 2 mJy, the number counts not only suffer from small number statistics, but they also suffer from big uncertainties in the original fluxes (Chen et al., 2011). Arcsecond level imaging can readily solve this problem, as well as locate the counterparts for detailed follow-up studies.

All these results on faint SMGs show that high resolution submm imaging is critical and necessary to unbiasedly study this population. However current understanding on this population is still suffering from its small number statistics. The progress has been very slow mainly due to the limitation on the sensitivity of single-dish telescopes as well as interferometers. More faint SMGs are needed to be and will be uncovered with next generation survey instrument SCUBA2 and imaged with high resolution interferometer ALMA to help us better under stand this currently unexplored yet very important population.

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MILLIMETER IMAGING OF THE β PICTORIS DEBRIS DISK: EVIDENCE FOR A PLANETESIMAL BELT

David J. Wilner, Sean M. Andrews, A. Meredith Hughes

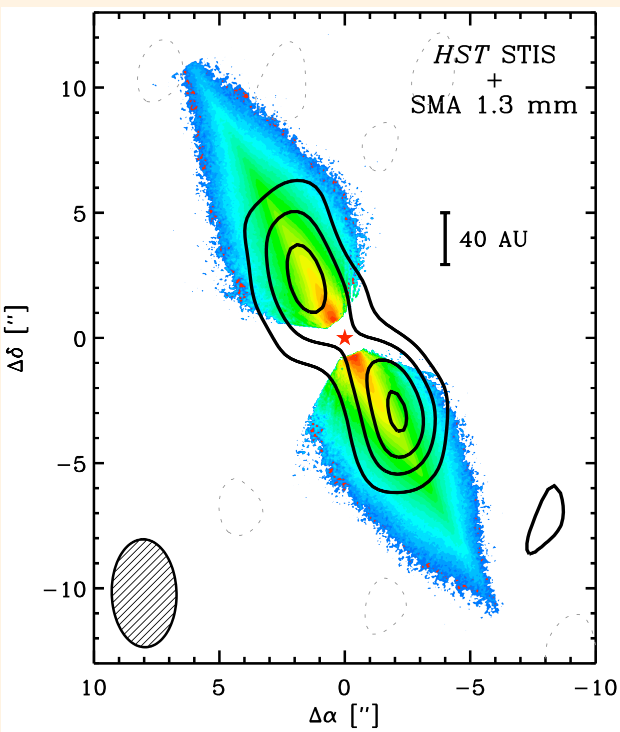

Figure 1: SMA image of the 1.3 millimeter continuum emission from β Pictoris overlayed on an image of optical scattered light from Heap et al. (2000). The contour levels are in increments of twice the rms noise level of 0.6 mJy. The ellipse in the lower left corner represents the 4.3 x 2.6 arcsec beam. The star symbol indicates the location of the stellar photosphere.

The discovery of excess far-infrared emission from the nearby (19.44 ± 0.05 pc), young (12^{+8}_{-4} Myr) A6V-type star *β* Pictoris (Aumann et al. 1985), together with optical imaging of scattered light from circumstellar dust (Smith and Terrile 1994) established the "debris disk" paradigm in which dust grains orbiting the star originate from an eroding reservoir of larger bodies, similar to Kuiper Belt Objects in our Solar System. The nearly edge-on disk surrounding *β* Pictoris has been imaged in great detail at optical and infrared wavelengths and shows a wealth of structure, including density concentrations, an inner cavity, as well as asymmetries such as warps. These features have been variously ascribed to the gravitational influence of a giant planet or planets. Indeed, a planetary mass companion at a projected distance of 8 AU from the star has been imaged directly (Lagrange et al. 2010).

The emerging view of debris disks like *β* Pictoris postulates the presence of planetesimal belts that produce dust with a range of sizes through collisional cascades. The stirring of the planetesimals may be due to the gravity of Pluto-size objects forming within the belt, or due to a planet or planets located closer to the central star. In either case, the effects of stellar radiation and winds create a distribution of grain sizes that varies with radius from the star. The smallest "*β*-meteoroid" grains blow-out to large radii, while the largest grains are minimally affected by these forces and provide the best probes of the dust-producing parent planetesimals. As a result, images of debris disks at widely spaced wavelengths are dominated by different grain populations and should appear dramatically different (Wyatt 2006). Millimeter wavelengths are especially interesting because the emission is dominated by the grains of the largest accessible sizes.

For the *β* Pictoris debris disk, the angular resolutions of previous millimeter and submillimeter images have been too coarse to reveal much structure. Images from several single dish telescopes generally show dust emission extended along a position angle of

30 degrees, consistent with the optical disk. Interferometry offers a way to obtain higher resolution. In Wilner et al. (2011), we used the eight element SMA on Mauna Kea, Hawaii to observe β Pictoris at a wavelength of 1.3 millimeters in two configurations in 2010 August and September (baselines from 6 to 178 meters). The β Pictoris system is a challenging target for the SMA because it never rises above an elevation of 20 degrees. Nonetheless, we obtained usable data in good weather conditions. Figure 1 shows a contour image of the 1.3 millimeter emission overlaying a Hubble Space Telescope/STIS coronographic image of optical scattered light from Heap et al. (2000). The symmetric, double-peaked morphology of the millimeter emission suggests a highly inclined belt or ring, where the peaks are due to limb brightening at the ansae (where column density is highest).

We used a simple model to constrain the basic properties of the emission, characterizing the structure by a flat, axisymmetric belt. We take the radial profile of the emission to be $r^{-0.5}$, which is physically motivated by optically thin emission for constant surface density and a temperature profile of $r^{-0.5}$ due to stellar irradiation. The best-fit model has the belt center at $R = 94 \pm 8$ AU, belt width $\Delta R = 34^{+44}_{-32}$ AU, and flux $F = 15 \pm 2$ mJy, where the uncertainties represent formal 1σ errors. This model reproduces the main features of the data, strongly constrains the belt center location, and allows for widths up to the resolution of the observations.

The SMA observations start to resolve fine structure in the millimeter emission. Most notably, the location of the emission belt corresponds closely to a prominent break in the slope of the optical scattered light, as well as a change in the optical color gradient. Theory predicts these demarcate the outer extent of the planetesimal disk, where small grains are expelled to create a radial gradient in grain size (Augereau and Beust 2001, Strubbe and Chiang 2006). We therefore identify the resolved emission belt as the location of the parent planetesimals.

The SMA image of the dust belt around β Pictoris sets the stage for much improved future observations with the ALMA, which is much better placed for aperture synthesis observations of this southern source. More detailed millimeter images have the potential to determine, e.g. if the emission exhibits pericenter glow or other asymmetries that could point to dynamical perturbations from planets in this remarkable system.

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PHYSICAL PROPERTIES OF THE CIRCUMNUCLEAR STARBURST RING IN THE BARRED GALAXY NGC1097

Pei-Ying Hsieh, Paul Ho

High resolution ^{12}CO(J = 2-1) images of the Seyfert 1/starburst ring galaxy NGC 1097 were made with the SMA (Hsieh et al. 2011). The purpose is to study the physical and kinematic properties of the 1-kpc circumnuclear starburst ring. Individual star clusters as detected in the HST map of Paα line emission have been used to determine the star formation rate, and are compared with the properties of the molecular gas. The molecular ring has been resolved into individual clumps at GMA-scale of 200-300 pc in all three CO lines. The intersection between the dust lanes and the starburst ring, which is associated with orbit-crowding region, is resolved into two physically/kinematically distinct features in the 1.5"×1.0" (105×70 pc) ^{12}CO(J = 2-1) map. The clumps associated with the dust lanes have broader line width, higher surface gas density, and lower star formation rate, while the narrow line clumps associated with the starburst ring have opposite characteristics. Toomre-Q value under unity at the radius of the ring suggests that the molecular ring is gravitationally unstable to fragment at the scale of the GMA. Our resolved CO map, especially in the orbit-crowding region, for the first time demonstrates observationally that the physical/kinematic properties of the GMAs are affected by the large scale bar-potential dynamics in NGC 1097.

NGC 1097 is a typical barred spiral galaxy. Its optical image shows a circumnuclear starburst ring with a diameter of 1.4 kpc. A pair of dust lanes are located at the leading edges of the major stellar bar. The starburst ring hosts "hot-spots" composed of super star clusters identified in HST images (Barth et al. 1995). A burst of star formation likely occurred ~ 6-7 Myr ago (Kotilainen et al. 2000). Previous maps in HCN(J=1-0), low excitation lines of ^{12}CO(J = 1-0) and ^{12}CO(J = 2-1) (Kohno et al. 2003; Hsieh et al.

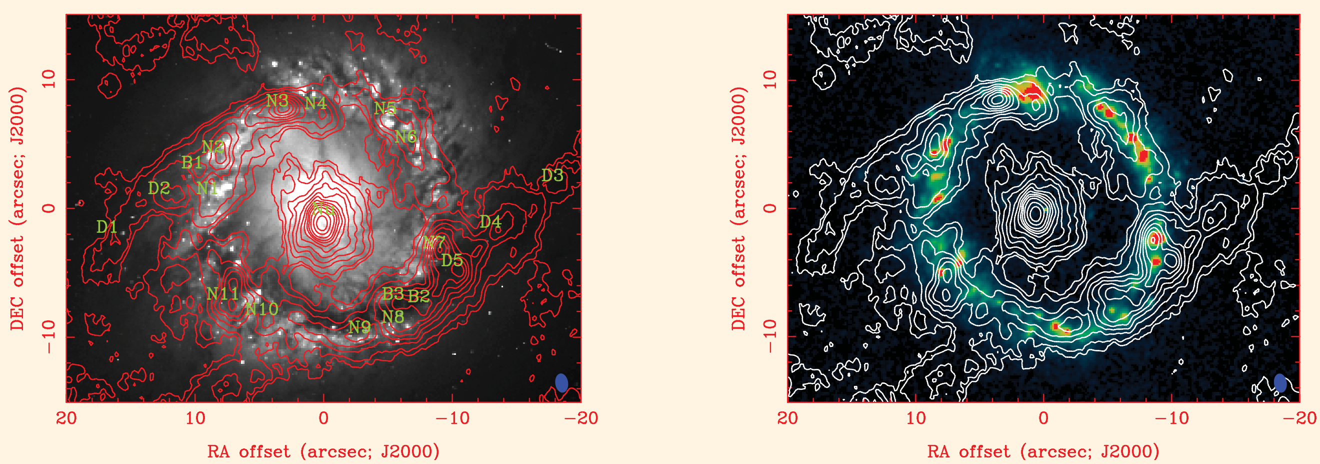

Figure 1. Left image is the ^{12}CO(J = 2-1) integrated map (contours) overlaid on the archival HST I-band (Filter F814 W) image (color). The IDs for the individual peaks of clumps are marked. N1…11 stand for the narrow line clumps, B1…3 and D1…5 stand for broad line clumps. The CO synthesized beam (1.5" ×1.0") is shown in the lower right corner. Right image is the HST NICMOS Paα line image (color) overlaid on the ^{12}CO(J = 2-1) contour. The contour levels for the ^{12}CO(J = 2-1) are 2, 3, 5, ..., 20, 25, and 30 σ (1 σ = 2.3 Jy km/s/beam).

2008), show a central molecular concentration coincident with the peak of the 6-cm radio continuum core (Hummel et al. 1987), as well as a molecular ring coincident with the starburst ring. A pair of molecular ridges coincident with the dust lanes are also detected, and show non-circular motions. The molecular ring exhibits a twin-peak structure in the 4″-10″ resolution interferometric CO and HCN maps, where large amount of molecular concentrations are located in the intersection of the molecular dust lanes and the star forming ring. This twin-peak structure can be explained by the crowding of gas streamlines (e.g. Kenny et al. 1992). The gas flow gradually changes direction and migrates toward the center of the galaxy to accumulate to form a ring (Athanassoula et al. 1992; Piner et al. 1995). In **Figure 1,** we show our 1″ resolution ^{12}CO(J = 2-1) integrated intensity map, the astrometry corrected HST I-band, and the Paα line map. The maps show a central concentration and a ring-like structure at a radius of ~10″ (700 pc). Our high angular resolution map for the first time resolves the molecular gas into individual GMAs in the star forming ring, the dust lanes, and in the twin-peak structures. The morphology of the molecular gas is tightly correlated to the optical features.

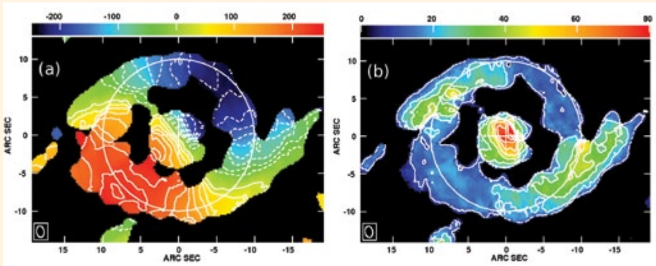

Figure 2. (a) The intensity weighted mean velocity map (MOM1) of 12CO(J = 2-1) line with respect to the systematic velocity (1254 km/s), solid and dashed lines represent the redshifted and blueshifted velocity respectively. The first negative contour (close to the central cross) is 0 km/s, and the contour spacing is in 25 km/s resolution. **(b)** The intensity weighted velocity dispersion map (MOM2). The contour interval is 10 km/s, note the values are not FWHM line width but the square root of the dispersion relative to the mean velocity. Therefore the number is lower than the FWHM we derived by line fitting.

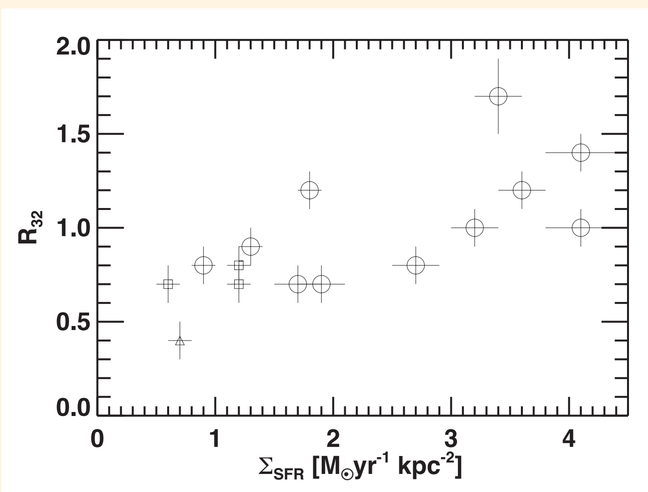

Figure 3. Surface SFR density is shown as a correlation of R32.

We measured the velocity dispersion and the surface gas mass density (ΣH_2), which show azimuthal variations in the ring. The GMAs coincident with the dust lanes, and parts of the ring in the twin-peak region, have broader line width and higher ΣH_2 than the GMAs coincident with star forming regions. Based on the Large Velocity Gradient (LVG) analysis, we found the narrow line clumps have higher temperature (>250 K) and density ((4.5 ±3.5)x10^3 cm^{-3}) in contrast to the broad line clumps (T = 45±15 K; n_{H2}= (8.5±1.5)x102 cm^{-3}). The higher ΣH_2, and the lower volume density nH_2, suggest that the broad line clumps are tracing the diffuse and cold gas at the surface of GMA rather than the dense and warm gas.

In **Figure 2a**, we show the intensity weighted isovelocity map of ^{12}CO(J = 2-1). The gas motion in the ring appears to be dominated by circular motion, while clear non-circular motions are indicated by the S-shape nearly parallel to the dust lanes. We also show the intensity weighted velocity dispersion map in **Figure 2b.** The velocity dispersion is larger in the twin-peak region, and lower in the region away from the twin-peak region.

In **Figure 3** we show the correlation of star formation rate density (ΣSFR) and intensity ratio of ^{12}CO(3-2)/^{12}CO(2-1) (R_{32}). The ΣSFR was measured from the Paα image corrected by extinction. The SFR is correlated to R_{32}, suggesting that the star formation activities and the physical conditions of the molecular gas are associated with each other. In contrast to the velocity dispersion and the ΣH_2, the SFR and R_{32} are not correlated with the large scale dynamics. This suggests that the visible star formation activities remain a localized phenomenon. There is also a deficiency of star clusters in the broad line clumps associated with the dust lanes. This could be due to extinction although we found it is similar in the star forming ring and the dust lanes.

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WIDEBAND RECEIVER DEVELOPMENT FOR THE SMA

Edward Tong

Plans to increase the sensitivity of the SMA call for the development of wide-band dual frequency or dual polarization SIS receivers, each with an IF bandwidth of 18 GHz. This corresponds to a total of 2 x 36 GHz observing bandwidth for Double Sideband Receiver operation. The SMA currently offers observers a maximum total instantaneous bandwidth of 8 GHz, which is provided by single DSB receiver operation with an IF of 4-8 GHz, or dual receiver operation with an IF of 4-6 GHz for each working receiver. While the useable bandwidth at the SMA is dictated by the capability of the SMA correlator, the current generation of SIS receivers in use at the SMA also have limited bandwidth due primarily to the SIS mixer on-chip tuning and the cryogenic IF amplifier chain. Several years ago we demonstrated the feasibility of wide-band SIS mixing using a series-connected distributed SIS mixer array, designed at SAO and fabricated at the Microelectronics Devices Laboratory at JPL [1]. At that time however, suitably wide-band cryogenic amplifiers were not available. To a large extent this is still the case, however amplifiers are now available that enable significantly wider bandwidth receivers to be built than those currently in use at the SMA and other similar facilities.

While many SIS receivers currently in use incorporate single SIS elements, the wide instantaneous bandwidth mixers required for the SMA, a ground-based facility, necessitate the use of arrays of SIS junctions in order to remain linear given the increased loading from the atmosphere. In addition, the parasitic capacitance due to the on-chip tuning circuit needs to be minimized. As a consequence we are reexamining the 4-junction series array [1] and are developing a variation of the end-loaded stub SIS mixer successfully used in the majority of receivers in use at the SMA [2]. Both of these designs are shown in **Fig. 1** below.

In addition to a new SIS mixer design, upgrades to the cryogenic IF system are required to handle the wider IF. As a first step, we have equipped a spare 300 GHz SMA receiver insert with a new wideband 4-14 GHz isolator from Pamtech/Quinstar Corp.

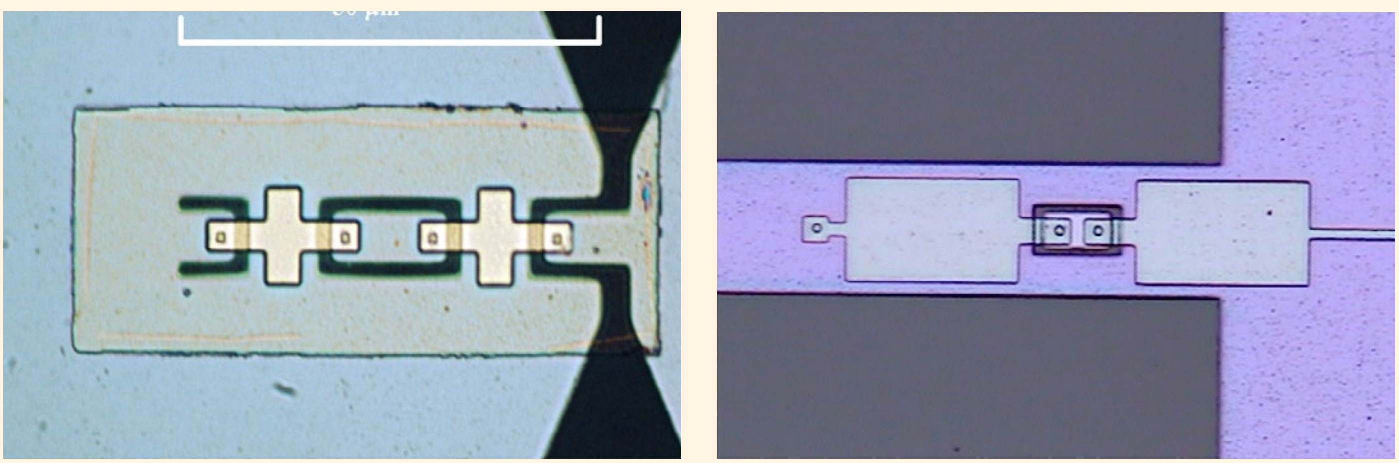

Figure 1. Wide-band SIS mixer chips designed and developed SAO. Left panel: 4-junction series-connected distributed array, fabricated at JPL for operation at 400 GHz. Right panel: 3-junction distributed array fed by a quarter-wave transformer, fabricated at ASIAA for operation at 200 GHz (courtesy of Mingjye Wang).

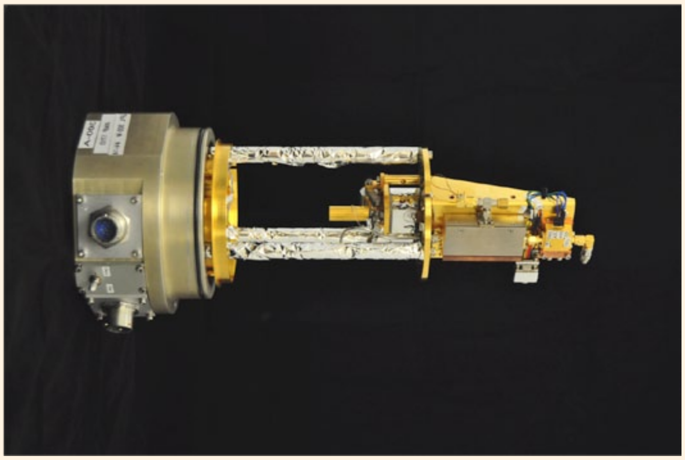

Figure 2. SMA receiver insert used to demonstrate wideband IF performance at 300 GHz. The wideband IF amplifier is located at the far right, with the new 4-14 GHz isolator sandwiched between it and the SIS mixer shown at the center of the frame.

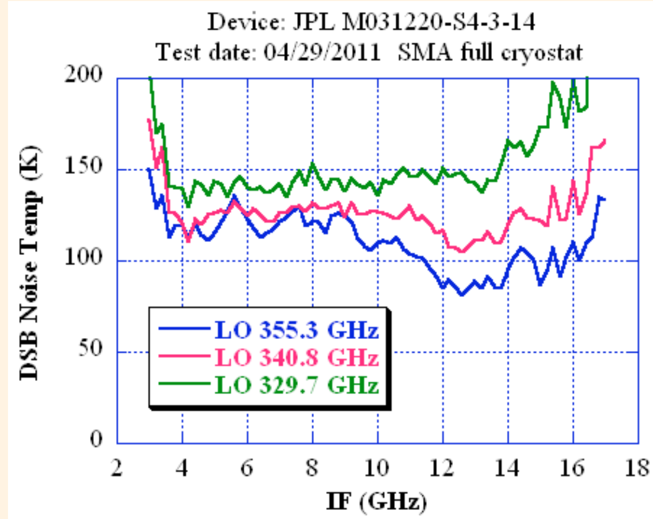

Figure 3. Measured DSB receiver noise temperature as a function of IF for the prototype wideband SMA 300 GHz receiver insert.

together with a wideband low-noise cryogenic amplifier (based on the WBA13 chip) developed at California Institute of Technology. Together these elements will enable low-noise operation across a 10 GHz-wide IF band. We have also incorporated a mixer housing a 4-junction series array, fabricated a number of years ago, into the receiver insert and made receiver noise measurements in a spare SMA receiver package complete with a full set of telescope coupling optics found inside each of the SMA antennas. Receiver sensitivity was determined from Y-factor made with hot and cold loads placed at the location of the calibration unit in the SMA optics train.

In **Fig. 3** above we plot the measured receiver noise temperature as a function of IF for three different Local Oscillator frequencies. The receiver sensitivity across the 4 – 8 GHz IF currently employed at the SMA is somewhat poorer than that of existing 300 GHz SMA receivers. This is hardly surprising since the older JPL mixer chips were designed to achieve optimum performance at 400 GHz. For these tests we have simply made use of a spare 300 GHz mixer block in order to demonstrate the wideband IF response, in this case up to 17 GHz. Referring again to **Fig. 3**, at the highest LO frequency, the receiver sensitivity improves towards the high end of the IF band. This effect is the result of an inductive tuning of the IF circuitry [3].

More extensive testing is currently underway, and we plan to field test two of these upgraded receiver inserts at the SMA in the coming months.

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- C.-Y.E. Tong, R. Blundell, K.G. Megerian, J.A. Stern, S.-K. Pan, and M. Popieszalski, "A distributed lumped-element SIS mixer with very wide instantaneous bandwidth," IEEE Trans. Appl. Supercond., vol. 15, pp. 490-494, June 2005.
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- C.-Y.E. Tong, R. Blundell, K.G. Megerian, J.A. Stern, M. Popieszalski, and S.-K. Pan, "Gain enhancement in inductively-loaded SIS junction arrays," IEEE Trans. Appl. Supercond., vol. 17, pp. 371-374, June 2007.

CALL FOR SMA SCIENCE OBSERVING PROPOSALS

The CfA SMA Time Allocation Committee (TAC) solicits proposals for observations for the period 2011 Nov 16 - 2012 May 15. The deadline for submitting proposals is 2011 September 14 (20:00 GMT = 16:00 EDT = 10:00 HST). For more information please see link below.

http://sma1.sma.hawaii.edu/call.html

POSTDOCTORAL OPPORTUNITIES AT THE SMA

SMA Postdoctoral Fellowship Applications are invited for SMA Postdoctoral Fellowships starting in fall 2012. These positions are aimed chiefly at research in submillimeter astronomy, and successful candidates will participate either in observations with the SMA or in their interpretation. For more information please see link below. Closing date: 10/01/2011

http://www.cfa.harvard.edu/opportunities/fellowships/sma/

SMA COMMUNITY DAY

The SMA recently hosted a Community Day to update CfA staff on the technical capabilities of the SMA, to present some recent science results and to assist CfA scientists in determining how the SMA can help them in their research.

http://www.cfa.harvard.edu/sma/events/SMAday/program/

The meeting format consisted of both scientific and technical talks with ample time for discussion and questions. The scientific program included presentations on traditional millimeter/submillimeter topics: disks of various flavors, evolved stars, planetary atmospheres, nearby starbursts, gravitationally-lensed ULIRGS; and highlighted some unique capabilities such as magnetic field mapping. It also included recent results from observations of transient phenomena such as gamma ray bursts and supernovae, made possible by operational agility and recent improvements in receiver sensitivity.

The technical program introduced the SMA to non-expert users to better enable them to plan future observations with the SMA. Finally, the future of the SMA, which has just been awarded a fifteen-year extension, was discussed in the context of the ALMA era.

PROPOSAL STATISTICS (16 MAY 2011-15 NOVEMBER 2012)

The SMA received a total of 110 proposals (SAO: 83, ASIAA: 18, UH: 9) requesting observing time in the 2011A semester. The proposals received by the joint SAO and ASIAA Time Allocation Committee are divided among science categories as follows:

Category	Proposals
Star-formation	65
Extragalactic	24
Galactic center	4
Planetary	1
Stellar	6
UH	9
Other	1

TRACK ALLOCATIONS BY WEATHER REQUIREMENT (ALL PARTNERS):

PWV[1]	SAO	ASIAA	UH[2]
< 4mm	6A + 43B	7A + 2B	10
< 2.5mm	28A + 37B	3A + 6B	7
< 1 mm	9A +5B	0A + 0B	3
Total	**43A + 85B**	**10A + 8B**	**20**

(1) Precipitable water vapor required for the observations.
(2) UH does not list As and Bs.

TOP-RANKED SAO AND ASIAA PROPOSALS - 2011A SEMESTER

The following is the listing of all SAO and ASIAA proposals with at least partial A ranking with the names and affiliations of the principal investigators.

STAR FORMATION

J. Brown, Harvard-Smithsonian CfA
Is the 40 AU gas hole in transition disk Oph IRS 48 cleared of large dust grains?

P. Frau, Institut de Ciències de l'Espai (IEEC-CSIC)
Revealing the magnetic field and rotation properties of the accretion disk around a massive protostar

R. Harris, Harvard-Smithsonian CfA
A Census of Protoplanetary Disks in Rho Oph Binaries: the Timescale for Tidal Stripping

I. Jimenez-Serra, Harvard-Smithsonian CfA
Radio Recombination Maser Lines toward NGC7538 IRS1?

K. Johnston, Max Planck Institute for Astronomy
Tracing the effects of ionization and stellar winds towards the early B-type protostar, G25.65+1.05

C. Lee, ASIAA
A Big Hollow Rotating Jet From a Low-Mass Protostar?

S. Liu, ASIAA
Characterizing The Early Stages of Massive Star Formation - A Case Study of IRDC G34.43+0.24

B. Parise, Max Planck Institut fuer Radioastronomie
Development of molecular complexity in a protosolar nebula: deuterated water, formaldehyde and methanol in IRAS16293-2422

K. Qiu, Max-Planck-Institute for Radioastronomy
A Primary Wind in Massive Star Formation? Proper motion and excitation of molecular bullets in HH 80—81

K. Wang, Harvard-Smithsonian CfA
Hierarchical Fragmentation in the Galactic 'Snake'

D. Wilner, Harvard-Smithsonian CfA
Resolving Structure in the Debris Disk around AU Mic

H. Yen, ASIAA
Direct Measurements of Disk Sizes Around Protostars

Q. Zhang,Harvard-Smithsonian CfA
Filaments, Star Formation and Magnetic Fields

EXTRAGALACTIC

S. Bussmann, Harvard-Smithsonian CfA
Long Baseline SMA Imaging of Strongly-lensed Galaxies Discovered In Herschel Surveys

Clements, D. Imperial College London
Detailed Imaging of Herschel Selected Candidate High z Galaxies

P. Cox, IRAM
Mapping the [CII] Emission in a gravitationally lensed z=4.24 SMG from the Herschel ATLAS

G. Fazio,Harvard-Smithsonian CfA
SMA Observations of a Newly Discovered Bright Cluster-Lensed Submillimeter Galaxy at z>3

K. Sakamoto, ASIAA
Vibrational Excitation in Galaxy Nuclei

L. Wei, Harvard-Smithsonian CfA
Modeling the ISM of Local LIRGs

B. Zauderer, Harvard-Smithsonian CfA
Progenitors to Probes: New Insights on GRBs from Combined mm/cm Observations

GALACTIC CENTER

P. Ho, SAO/ASIAA
KISS: Kinematic Processes of the Extremely Turblent ISM around the Supermassive Blackholes

D. Marrone, University of Arizona
Disentangling the Polarization of Sagittarius A with SMA and CARMA*

PLANETARY

A. Moullet, Harvard-Smithsonian CfA
Measuring the thermal lightcurve of asteroid (4) Vesta

OTHER

B. Parise, Max Planck Institut fuer Radioastronomie
Probing cold gas in the line of sight of SgrB2(M) : a confirmation of the detection of H_2D^+

ALL SAO PROPOSALS - 2010B SEMESTER

The following is a list of all the SAO proposals observed in the 2010B semester (16 November 2010 - 15 May 2011)

S. Aalto, Onsala Space Observatory
HCN vibrational line in the dusty IR galaxy IC 860

S. Andrews, Harvard-Smithsonian CfA
A Protoplanetary Disk Census in Taurus Multiple Star Systems

A. Baker, Rutgers University
Spatially resolved dust emission in a lensed UV-selected star-forming galaxy

E. Berger, Harvard University
Progenitors to Probes: New Insights on GRBs from Combined mm/cm Observations

T. Bourke Harvard-Smithsonian CfA
Imaging the base of the CO outflow toward the AFGL2591 high-mass star-forming region

J. Brown, Harvard-Smithsonian CfA
Resolving the inner dust hole in SU Aur

S. Bussmann, Harvard-Smithsonian CfA
Mapping Bright Gravitationally Lensed Herschel ULIRGs at High Redshift

X. Chen, Yale University
SMA Observations of IRAM 04191+1522: A Multiple System?

A. Chung, Yonsei University
ISM under ICM Pressure: Physical and Chemical Conditions of ISM in Ram Pressure Stripped Virgo Galaxies

D. Clements, Imperial College London
Detailed Study of Herschel Selected Candidate High z Galaxies

C. Cyganowski, Harvard-Smithsonian CfA
Comparing Active and Fossil Outflows in MYSOs from the RMS Survey

Y. Dai, Harvard-Smithsonian CfA
SMA study of highest-redshift SMG candidates in SXDF

C. Dedes, ETH Zurich
The origin of complex oxygen chemistry in the high mass star forming region IRAS17470-2853

C. Dedes, ETH Zurich
High Mass Star Formation in the outer Galaxy - 06055+2039

S. Doeleman, MIT Haystack Observatory
The Event Horizon Telescope: VLBI of SgrA and M87 with the SMA*

M. Dunham, Yale University
SMA Observations of a Candidate First Hydrostatic Core

C. Espaillat, Harvard-Smithsonian CfA
Constraining the Masses of T Tauri Disks in the Epoch of Planet Formation (copied from 2009B-S043)

A. Gomez-Ruiz, Max-Planck-Institut fuer Radioastronomie
Young massive outflows in new samples of massive protostars

R. Harris, Harvard-Smithsonian CfA
Extending the Taurus Multiple Star System Disk Census to Wide Binaries

K. Immer, Harvard-Smithsonian CfA
A Panchromatic High-Resolution View of a Complex Star Forming Region

I. Jimenez-Serra, Harvard-Smithsonian CfA
Imaging the ion and neutral components of the magnetic precursor of C-shocks toward the young L1448-mm outflow.

I. Jimenez-Serra, Harvard-Smithsonian CfA
Imaging the base of the CO outflow toward the AFGL2591 high-mass star forming region

J. Jorgensen, Niels Bohr Institute and Centre for Star and Planet FormationR.
A Precise Measurement of the Deuteration of Water in Low-Mass Protostars

R. Kawabe, NAOJ
Search for first adiabatic cores toward AzTEC/ASTE 1.1 mm sources in Lupus-I and ρOph

E. Keto, Harvard-Smithsonian CfA
H2D+ in the L1544 starless core

E. Keto, Harvard-Smithsonian CfA
PG QSOs and HII Regions

H. Li, MPIA
Does Spiral Magnetic Field Anchor in Ringed Arms

F. Liu, MPIFR
The distribution of deuterated water within the envelopes of high-mass hot cores

H. Lu, Harvard-Smithonian CfA
Filamentary Spiral Structures in the Self-Gravitational Accretion Flow

D. Marrone, University of Arizona
Characerization of the Brightest Submillimeter Galaxies

I. McHardy, University of Southampton
The origin of the millimetre and X-ray emission in M81: Test of jet models

G. Melnick, Harvard-Smithsonian CfA
Submillimeter Water Masers in Orion

R. Moreno, Observatoire de Paris-Meudon
Confirmation of the first detection of HNC on Titan

S. Muller, Onsala Space Observatory
CO in the supernova remnant Cas A

K. Oberg, Harvard-Smithsonian CfA
Resolving the Radiation Chemistry in the DM Tau Disk

N. Patel, Harvard-Smithsonian CfA
Extending the SMA Line Survey of IRC+10216 in the 400 GHz band

N. Patel, Harvard-Smithsonian CfA
Probing the physical and chemical differences in the binary components of IRAS 16293-2422

A. Sicilia-Aguilar, Max-Planck-Institut fuer Astronomie
Resolving the dynamics and structure of the GW Ori system

J. Tobin, University of Michigan
Unveiling the Forming Protostellar Disk in L1527

J. Turner, UCLA
Molecular Gas and Star Formation Efficiency in NGC 5253

V.U, Harvard-Smithsonian CfA
Mapping the Molecular Gas in the Nuclei of Luminous Infrared Galaxies

K. Wang, Harvard-Smithsonian CfA
Studying high velocity gas component in the inner part of massive star forming region S255 with HCCCN line

J. Wang, Nanjing University
Hierarchical Fragmentation at the Beginning of Massive Star Cluster Formation: A Tale of Two IRDCs

A. Wehrle, Space Science Institute
Coordinated SMA-Herschel-Fermi Observations of 3C279 and 3C454.3

L. Wei, Harvard-Smithsonian CfA
M83 and Arp 193

X. Xu, Harvard-Smithsonian CfA
12CO(2-1) and 13CO(2-1) in the Antennae Galaxies (NGC 4039/39)

M. Yun, University of Massachusetts
Spatial Extent and Origin of the Luminosity for High Redshift Submillimeter Galaxies

L. Zapata, CRyA-UNAM
Nature of the jet rotation in NGC 1333-IRAS2A

RECENT PUBLICATIONS

Title: Molecular Outflows in the Substellar Domain: Millimeter Observations of Young Very Low Mass Objects in Taurus and ρ Ophiuchi
Authors: Phan-Bao, Ngoc; Lee, Chin-Fei; Ho, Paul T. P.; Tang, Ya-Wen
Publication: The Astrophysical Journal, Volume 735, Issue 1, article id. 14 (2011). (ApJ Homepage)
Publication Date: 07/2011
Abstract: http://arxiv.org/abs/1104.2831

Title: Outflow activities in the young high-mass stellar object G23.44-0.18
Authors: Ren, Jeremy Zhiyuan; Liu, Tie; Wu, Yuefang; Li, Lixin
Publication: *Monthly Notices of the Royal Astronomical Society: Letters, Online Early* (MNRAS Homepage)
Publication Date: 06/2011
Abstract: http://adsabs.harvard.edu/abs/2011MNRAS.415L..49R

Title: First Results from a 1.3 cm EVLA Survey of Massive Protostellar Objects: G35.03+0.35
Authors: Brogan, C. L.; Hunter, T. R.; Cyganowski, C. J.; Friesen, R. K.; Chandler, C. J.; Indebetouw, R.
Publication: *eprint arXiv*:1106.0942
Publication Date: 06/2011
Abstract: http://arxiv.org/abs/1106.0942

Title: Connection Between the Accretion Disk and Jet in the Radio Galaxy 3C 111
Authors: Chatterjee, Ritaban; Marscher, Alan P.; Jorstad, Svetlana G.; Markowitz, Alex; Rivers, Elizabeth; Rothschild, Richard E.; McHardy, Ian M.; Aller, Margo F.; Aller, Hugh D.; Lähteenmäki, Anne; Tornikoski, Merja; Harrison, Brandon; Agudo, Iván; Gómez, José L.; Taylor, Brian W.; Gurwell, Mark
Publication: *The Astrophysical Journal,* Volume 734, Issue 1, article id. 43 (2011). (ApJ Homepage)
Publication Date: 06/2011
Abstract: http://arxiv.org/abs/1104.0663

Title: Dispersion of Magnetic Fields in Molecular Clouds. III.
Authors: Houde, Martin; Rao, Ramprasad; Vaillancourt, John E.; Hildebrand, Roger H.
Publication: *The Astrophysical Journal,* Volume 733, Issue 2, article id. 109 (2011). (ApJ Homepage)
Publication Date: 06/2011
Abstract: http://arxiv.org/abs/1103.4772

Title: High resolution CO observation of massive star forming regions
Authors: Klaassen, P. D.; Wilson, C. D.; Keto, E. R.; Zhang, Q.; Galván-Madrid, R.; Liu, H.-Y. B.
Publication: *Astronomy & Astrophysics,* Volume 530, id.A53 (A&A Homepage)
Publication Date: 06/2011
Abstract: http://arxiv.org/abs/1103.5706

Title: On the kinematics of massive star forming regions: the case of IRAS 17233-3606
Authors: Leurini, S.; Codella, C.; Zapata, L.; Beltrán, M. T.; Schilke, P.; Cesaroni, R.
Publication: *Astronomy & Astrophysics,* Volume 530, id.A12 (A&A Homepage)
Publication Date: 06/2011
Abstract: http://arxiv.org/abs/1104.0857

Title: SMA/PdBI multiple line observations of the nearby Seyfert2 galaxy NGC 1068: Shock related gas kinematics and heating in the central 100pc?
Authors: Krips, M.; Martin, S.; Eckart, A.; Neri, R.; Garcia-Burillo, S.; Matsushita, S.; Peck, A.; Stoklasova, I.; Petitpas, G.; Usero, A.; Combes, F.; Schinnerer, E.; Humphreys, L.; Baker, A. J.
Publication: *eprint arXiv:*1105.6089
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.6089

Title: Catching the radio flare in CTA 102 I. Light curve analysis
Authors: Fromm, C. M.; Perucho, M.; Ros, E.; Savolainen, T.; Lobanov, A. P.; Zensus, J. A.; Aller, M. F.; Aller, H. D.; Gurwell, M. A.; Lähteenmäki, A.
Publication: *eprint arXiv:*1105.5024
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.5024

Title: Hierarchical Fragmentation and Jet-like Outflows in IRDC G28.34+0.06: A Growing Massive Protostar Cluster
Authors: Wang, Ke; Zhang, Qizhou; Wu, Yuefang; Zhang, Huawei
Publication: *The Astrophysical Journal,* Volume 735, Issue 1, article id. 64 (2011). (ApJ Homepage)
Publication Date: 07/2011
Abstract: http://arxiv.org/abs/1105.4559

Title: Skewed Distributions and Opposite Velocity Gradients of Submillimeter Molecular Lines in Low-Mass Protostellar Envelopes
Authors: Takakuwa, Shigehisa; Kamazaki, Takeshi
Publication: *eprint arXiv:*1105.3787
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.3787

Title: Physical properties of the circumnuclear starburst ring in the barred Galaxy NGC 1097
Authors: Hsieh, Pei-Ying; Matsushita, Satoki; Liu, Guilin; Ho, Paul T. P.; Oi, Nagisa; Wu, Ya-Lin
Publication: *eprint arXiv:*1105.3543
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.3543

Title: An Envelope Disrupted by a Quadrupolar Outflow in the Pre-Planetary Nebula IRAS19475+3119
Authors: Hsu, Ming-Chien; Lee, Chin-Fei
Publication: *eprint arXiv:*1105.2410
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.2410

Title: Protoplanetary Disk Masses in IC348: A Rapid Decline in the Population of Small Dust Grains After 1 Myr
Authors: Lee, Nicholas; Williams, Jonathan P.; Cieza, Lucas A.
Publication: *eprint arXiv:*1105.2046
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.2046

Title: On the Location of the γ-Ray Outburst Emission in the BL Lacertae Object AO 0235+164 Through Observations Across the Electromagnetic Spectrum
Authors: Agudo, Iván; Marscher, Alan P.; Jorstad, Svetlana G.; Larionov, Valeri M.; Gómez, José L.; Lähteenmäki, Anne; Smith, Paul S.; Nilsson, Kari; Readhead, Anthony C. S.; Aller, Margo F.; Heidt, Jochen; Gurwell, Mark; Thum, Clemens; Wehrle, Ann E.; Nikolashvili, Maria G.; Aller, Hugh D.; Benítez, Erika; Blinov, Dmitriy A.; Hagen-Thorn, Vladimir A.; Hiriart, David; Jannuzi, Buell T.; Joshi, Manasvita; Kimeridze, Givi N.; Kurtanidze, Omar M.; Kurtanidze, Sofia O.; Lindfors, Elina; Molina, Sol N.; Morozova, Daria A.; Nieppola, Elina; Olmstead, Alice R.; Reinthal, Riho; Roca-Sogorb, Mar; Schmidt, Gary D.; Sigua, Lorand A.; Sillanpää, Aimo; Takalo, Leo; Taylor, Brian; Tornikoski, Merja; Troitsky, Ivan S.; Zook, Alma C.; Wiesemeyer, Helmut
Publication: *The Astrophysical Journal Letters,* Volume 735, Issue 1, article id. L10 (2011). (ApJL Homepage)
Publication Date: 07/2011
Abstract: http://arxiv.org/abs/1105.0549

Title: The Circular Polarization of Sagittarius A* at Submillimeter Wavelengths
Authors: Muñoz, Diego J.; Marrone, Daniel P.; Moran, James M.; Rao, Ramprasad
Publication: *eprint arXiv:*1105.0427
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1105.0427

Title: Submillimeter continuum observations of Sagittarius B2 at subarcsecond spatial resolution
Authors: Qin, S.-L.; Schilke, P.; Rolffs, R.; Comito, C.; Lis, D. C.; Zhang, Q.
Publication: *Astronomy & Astrophysics,* Volume 530, id.L9 (A&A Homepage)
Publication Date: 06/2011
Abstract: http://arxiv.org/abs/1105.0344

Title: Submillimeter Sources behind the Massive Lensing Clusters A370 and A2390
Authors: Chen, Chian-Chou; Cowie, Lennox L.; Wang, Wei-Hao; Barger, Amy J.; Williams, Jonathan P.
Publication: *The Astrophysical Journal,* Volume 733, Issue 1, article id. 64 (2011). (ApJ Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1103.4376

Title: IRDC G030.88+00.13: A Tale of Two Massive Clumps
Authors: Zhang, Qizhou; Wang, Ke
Publication: *The Astrophysical Journal,* Volume 733, Issue 1, article id. 26 (2011). (ApJ Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1103.5092

Title: Extremely Broad Radio Recombination Maser Lines Toward the High-velocity Ionized Jet in Cepheus A HW2
Authors: Jiménez-Serra, I.; Martín-Pintado, J.; Báez-Rubio, A.; Patel, N.; Thum, C.
Publication: *The Astrophysical Journal Letters,* Volume 732, Issue 2, article id. L27 (2011). (ApJL Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1103.4073

Title: Resolved Images of Large Cavities in Protoplanetary Transition Disks
Authors: Andrews, Sean M.; Wilner, David J.; Espaillat, Catherine; Hughes, A. M.; Dullemond, C. P.; McClure, M. K.; Qi, Chunhua; Brown, J. M.
Publication: *The Astrophysical Journal,* Volume 732, Issue 1, article id. 42 (2011). (ApJ Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1103.0284

Title: AGILE detection of extreme γ-ray activity from the blazar PKS 1510-089 during March 2009. Multifrequency analysis
Authors: D'Ammando, F.; Raiteri, C. M.; Villata, M.; Romano, P.; Pucella, G.; Krimm, H. A.; Covino, S.; Orienti, M.; Giovannini, G.; Vercellone, S.; Pian, E.; Donnarumma, I.; Vittorini, V.; Tavani, M.; Argan, A.; Barbiellini, G.; Boffelli, F.; Bulgarelli, A.; Caraveo, P.; Cattaneo, P. W.; Chen, A. W.; Cocco, V.; Costa, E.; Del Monte, E.; de Paris, G.; Di Cocco, G.; Evangelista, Y.; Feroci, M.; Ferrari, A.; Fiorini, M.; Froysland, T.; Frutti, M.; Fuschino, F.; Galli, M.; Gianotti, F.; Giuliani, A.; Labanti, C.; Lapshov, I.; Lazzarotto, F.; Lipari, P.; Longo, F.; Marisaldi, M.; Mereghetti, S.; Morselli, A.; Pacciani, L.; Pellizzoni, A.; Perotti, F.; Piano, G.; Picozza, P.; Pilia, M.; Porrovecchio, G.; Prest, M.; Rapisarda, M.; Rappoldi, A.; Rubini, A.; Sabatini, S.; Soffitta, P.; Striani, E.; Trifoglio, M.; Trois, A.; Vallazza, E.; Zambra, A.; Zanello, D.; Agudo, I.; Aller, H. D.; Aller, M. F.; Arkharov, A. A.; Bach, U.; Benitez, E.; Berdyugin, A.; Blinov, D. A.; Buemi, C. S.; Chen, W. P.; di Paola, A.; Dolci, M.; Forné, E.; Fuhrmann, L.; Gómez, J. L.; Gurwell, M. A.; Jordan, B.; Jorstad, S. G.; Heidt, J.; Hiriart, D.; Hovatta, T.; Hsiao, H. Y.; Kimeridze, G.; Konstantinova, T. S.; Kopatskaya, E. N.; Koptelova, E.; Kurtanidze, O. M.; Kurtanidze, S. O.; Larionov, V. M.; Lähteenmäki, A.; Leto, P.; Lindfors, E.; Marscher, A. P.; McBreen, B.; McHardy, I. M.; Morozova, D. A.; Nilsson, K.; Pasanen, M.; Roca-Sogorb, M.; Sillanpää, A.; Takalo, L. O.; Tornikoski, M.; Trigilio, C.; Troitsky, I. S.; Umana, G.; Antonelli, L. A.; Colafrancesco, S.; Pittori, C.; Santolamazza, P.; Verrecchia, F.; Giommi, P.; Salotti, L.
Publication: *Astronomy & Astrophysics,* Volume 529, id.A145 (A&A Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1103.3647

Title: Orion KL: the hot core that is not a "hot core"
Authors: Zapata, L. A.; Schmid-Burgk, J.; Menten, K. M.
Publication: *Astronomy & Astrophysics,* Volume 529, id.A24 (A&A Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1009.1426

Title: Discovery of a Multiply Lensed Submillimeter Galaxy in Early HerMES Herschel/SPIRE Data
Authors: Conley, A.; Cooray, A.; Vieira, J. D.; González Solares, E. A.; Kim, S.; Aguirre, J. E.; Amblard, A.; Auld, R.; Baker, A. J.; Beelen, A.; Blain, A.; Blundell, R.; Bock, J.; Bradford, C. M.; Bridge, C.; Brisbin, D.; Burgarella, D.; Carpenter, J. M.; Chanial, P.; Chapin, E.; Christopher, N.; Clements, D. L.; Cox, P.; Djorgovski, S. G.; Dowell, C. D.; Eales, S.; Earle, L.; Ellsworth-Bowers, T. P.; Farrah, D.; Franceschini, A.; Frayer, D.; Fu, H.; Gavazzi, R.; Glenn, J.; Griffin, M.; Gurwell, M. A.; Halpern, M.; Ibar, E.; Ivison, R. J.; Jarvis, M.; Kamenetzky, J.; Krips, M.; Levenson, L.; Lupu, R.; Mahabal, A.; Maloney, P. D.; Maraston, C.; Marchetti, L.; Marsden, G.; Matsuhara, H.; Mortier, A. M. J.; Murphy, E.; Naylor, B. J.; Neri, R.; Nguyen, H. T.; Oliver, S. J.; Omont, A.; Page, M. J.; Papageorgiou, A.; Pearson, C. P.; Pérez-Fournon, I.; Pohlen, M.; Rangwala, N.; Rawlings, J. I.; Raymond, G.; Riechers, D.; Rodighiero, G.; Roseboom, I. G.; Rowan-Robinson, M.; Schulz, B.; Scott, Douglas; Scott, K.; Serra, P.; Seymour, N.; Shupe, D. L.; Smith, A. J.; Symeonidis, M.; Tugwell, K. E.; Vaccari, M.; Valiante, E.; Valtchanov, I.; Verma, A.; Viero, M. P.; Vigroux, L.; Wang, L.; Wiebe, D.; Wright, G.; Xu, C. K.; Zeimann, G.; Zemcov, M.; Zmuidzinas, J.
Publication: *The Astrophysical Journal Letters,* Volume 732, Issue 2, article id. L35 (2011). (ApJL Homepage)
Publication Date: 05/2011
Abstract: http://arxiv.org/abs/1104.4113

Title: Star-forming Cloud Complexes in the Central Molecular Zone of NGC 253
Authors: Sakamoto, Kazushi; Mao, Rui-Qing; Matsushita, Satoki; Peck, Alison B.; Sawada, Tsuyoshi; Wiedner, Martina C.
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Title: Spitzer Imaging of Herschel-atlas Gravitationally Lensed Submillimeter Sources
Authors: Hopwood, R.; Wardlow, J.; Cooray, A.; Khostovan, A. A.; Kim, S.; Negrello, M.; da Cunha, E.; Burgarella, D.; Aretxaga, I.; Auld, R.; Baes, M.; Barton, E.; Bertoldi, F.; Bonfield, D. G.; Blundell, R.; Buttiglione, S.; Cava, A.; Clements, D. L.; Cooke, J.; Dannerbauer, H.; Dariush, A.; de Zotti, G.; Dunlop, J.; Dunne, L.; Dye, S.; Eales, S.; Fritz, J.; Frayer, D.; Gurwell, M. A.; Hughes, D. H.; Ibar, E.; Ivison, R. J.; Jarvis, M. J.; Lagache, G.; Leeuw, L.; Maddox, S.; Michałowski, M. J.; Omont, A.; Pascale, E.; Pohlen, M.; Rigby, E.; Rodighiero, G.; Scott, D.; Serjeant, S.; Smail, I.; Smith, D. J. B.; Temi, P.; Thompson, M. A.; Valtchanov, I.; van der Werf, P.; Verma, A.; Vieira, J. D.
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