Published on *I. Physikalisches Institut* (http://www.astro.uni-koeln.de)

Program

	Wednesday, 5. Oct	Thursday, 6. Oct	Friday, 7. Oct
09:00	Welcome, Logistics (Schilke)	ALMA and CCAT - synergies (Johnstone) PPT [1] PDF [2]	Lines at THz frequencies - lessons learned from HIFI (Plume) [3] KEY [4] PDF [5]
09:15	CCAT (Glenn) PPT [6] PDF [7]		
09:30		ALMA band 9 technology for CCAT (Baryshev) [8] PPT [9] PDF [10]	Large high resolution array development (Graf) ODP [11] PDF [12]
09:45	Large Scale Spectroscopic Surveys I (Heyer/Simon) [13] ODP [14] PDF [15]	High Spatial Resolution Large Scale Surveys (Carpenter) KEY [16] PDF [17]	
10:00			SOFIA and CCAT - synergies (Zinnecker) [18] PPT PDF [19]
10:15	Submm and IR studies of molecular regions in the Magellanic Clouds (Rubio) [20] PPT [21] PDF [22]	Using High Resolution Observations as a Probe of Pre-Stellar Core Dynamics (Yorke) [23]	
10:30	Coffee break/Poster viewing	Coffee break/Poster viewing	Coffee break/Poster viewing
11:00	Molecular Tracers of Turbulent Shocks in Molecular Clouds (Pon) [24] PPT [25] PDF [26]	Embracing Structural Diversity in wide-field CCAT Maps (Kauffmann) [27] PDF	Comets (Hartogh) PPT PDF

11:15	Large Scale Cloud and Star Formation in the Milky Way revealed by Hi-GAL (Molinari) PPT [28] PDF [29]	Large Scale Spectroscopic Surveys II: HOPS and MALT (Walsh) [30] PPT PDF [31]	
11:30			Conference summary/Discussion (Goldsmith) PDF [32]
11:45	What Shapes the Structure of Molecular Clouds: Turbulence or Gravity? (Kritsuk) [33] PPT [34] PDF [35]	Characterization of Cloud Structure (André) [36] PPT PDF [37]	
12:00	Herschel lessons for CCAT (Ossenkopf) PDF [38]		
12:15	DESHIMA: A Submillimeter Imaging-spectrograph Based on Superconducting Resonators (Endo) [39] PDF [40]	Zeeman Observations towards High Mass Star Forming Regions using the CCAT (Shinnaga) [41] KEY [42] PDF [43]	
12:30	Lunch break	Lunch break	Lunch break
14:00	ATLASGAL and Spectroscopic Followups (Wyrowski) [44] PDF [45]	High-resolution wide-band spectrometers for Large Heterodyne Arrays (Klein) [46] PPT PDF	End of conference
14:15			
14:30	The Bolocam Survey of the Galactic Plane (Bally) [47] PPT [48] PDF [49]	Signatures of Molecular Cloud Formation II (Dobbs) [50] KEY [51] PDF [52]	
14:45			
15:00	Water high resolution spectroscopic observations of protostars with Herschel (Herpin) [53]	The earliest phases of OB star formation revealed by the Herschel key program HOBYS (Hennemann) [56]	

	KEY [54] PDF [55]	PPT [57] PDF [58]	
15:15	ortho-H2 and the age of molecular clouds (Pagani) [59] PPT [60] PDF [61]	Large Scale Structures Traced By IRDCs (Fuller) [62] ODF [63] PDF [64]	
15:30	Coffee break/Poster viewing	Coffee break/Poster viewing	
16:15	Signatures of Molecular Cloud Formation I (Glover) [65] KEY [66] PDF [67]	Molecular Gas and Dust in Nearby Galaxies (Walter) PPT PDF [68]	
16:30			
16:45	Transition from Atomic to Molecular Gas (Goldsmith) PPT [69] PDF [70]	2 Millimeter Ultra Deep Field Observations (Staguhn) [71] PPT [72] PDF [73]	
17:00		High resolution absorption spectroscopy of galactic nuclei (Gerin) PPT [74] PDF [75]	
17:15	Continuum and molecular line surveys: the need of both to understand molecular cloud and star-formation (Schneider) [76] PPT [77] PDF [78]		
17:30		Densitometry and Thermometry of Starburst Galaxies (Mangum) [79] PPT [80] PDF [81]	

Session chairs:

Jonas Zmuidzinas (Wednesday morning)
Hans Olofsson (Wednesday afternoon)
Sue Madden (Thursday morning)
Frank Bertoldi (Thursday afternoon)
Michael Fich (Friday morning)

Posters

Name	Poster title	Abstract
Andrey Baryshev	Millimetron -- an opportunity for high resolution spectroscopy	Millimetron is a an approved space mission of Russian Space agency with the launch time frame of 2018+ dedicated to far infrared astronomy in 0.1-6 THz wavelengths. It will have a moderately cooled main dish of 10-12 m diameter with central of 3m capable to perform at 6 THz. It will be launched at large halo orbit at anti-solar Lagrangian point L2 which will provide stable environment both for total power and high resolution spectroscopy. We will present overall concept of the mission and concentrate on high resolution spectrometer instrument design, which currently includes small focal plane arras at frequencies up to 6THz. Status of critical technologies will be reviewed as well key science themes and possible synergies with CCAT development.
Emmanuel Caux		
Paolo Cortes		
		KAPPa (the Kilopixel Array Pathfinder Project) is an effort to develop key technologies to enable the construction of coherent heterodyne focal plane arrays in the terahertz frequency regime with ~1000 pixels. The current state-of-the-art pixel count for coherent terahertz focal plane arrays is ~100 pixels (the Supercam

Christopher Groppi	KAPPa (the Kilopixel Array Pathfinder Project)	350 GHz array with 64 pixels). The leap to ~1000 pixels requires several key technological problems to be tackled before the construction of such a focal plane is possible. While the previous generation of arrays used 1D integration of mixer elements into a linear array module, kilopixel instruments will require 2D integration, as has been done with incoherent terahertz and infrared detectors. Over the next three years, the KAPPa project will develop a small (16-pixel) 2D integrated heterodyne focal plane array for the 660 GHz atmospheric window as a technological pathfinder towards future kilopixel heterodyne focal plane arrays in the terahertz frequency regime. KAPPa will use SIS devices fabricated on SOI membranes with beam lead alignment and connection features, designed for high yield and fast installation. A SiGe low noise amplifier with on-chip bias tee will be integrated directly into the mixer block immediately adjacent to each mixer. This amplifier has been designed to yield adequate gain and low noise temperature, while dissipating less than 2mW of power. The SIS and LNA devices will be mounted in a 2D integrated metal micromachined mixer array consisting of a backshort block containing the SIS device and LNA, and a horn block using drilled smooth-wall feedhorns.

		Magnetic field will be delivered to the devices via compact, permanent magnets embedded in the horn block. We will also develop cryogenically compatible IF flex circuits to replace individual semi-rigid coaxial lines for IF signal transmission. Once completed, this instrument will demonstrate the critical technologies necessary to construct coherent arrays approaching 1000 pixels for large single-dish THz telescopes like CCAT.
Annie Hughes	Properties of GMCs in M51 and the Magellanic Clouds	With the Magellanic Mopra Assessment (MAGMA), we have recently completed a CO imaging survey of ~450 giant molecular clouds (GMCs) in the Large Magellanic Cloud (LMC). In this poster, I describe some results and ongoing work that deepen our understanding of GMC formation and evolution in the LMC. GMCs in the LMC appear to have lower mass surface densities than GMCs in nearby spirals (assuming that CO is a reliable tracer of molecular hydrogen) and, unlike the situation in the Galaxy, low-mass clouds contribute the bulk of the LMC's total molecular mass. The velocity gradients across GMCs are similar to those found in the surrounding atomic gas and do not appear indicative of rotation, contrary to a simple top-down model for GMC formation. We have examined

		the location of GMCs relative to young stellar objects (YSOs), finding some evidence that high-mass YSOs are better associated with CO emission. Sightlines with high HI column density and HI peak brightness have a higher probability of association with CO, although the detection fraction remains below 30% across the LMC. We find a weak anti-correlation between the detectability of CO and the HI velocity dispersion, which we interpret as a time delay between cloud compression and CO molecule formation.
Jacob Kooi	The technical factors and tradeoffs of large focal plane arrays; the need for input from the scientific community	The successful development of large (heterodyne) focal plane arrays needs to address a significant number of technical challenges, and will involve varies levels of compromise in order to fit the instrument within a finite budget and scope. The poster will discuss such issues as: Atmospheric band(s), pixel count, pixel homogeneity, reliability, frequency agility, RF bandwidth, IF bandwith, LO injection, focal plane optics, dc-power consumption, IF cabling, instrument stability, bias electronics, microphonics (LO standing wave), and backend processing. A large heterodyne focal plane array will thus be a massive tradeoff of a large parameter space, and the scientific community will need to guide and prioritize this tradeoff.

Magda Kulczak-Jastrzębska	Detection of the HDO ground state transition	We report the detection with the Caltech Submillimeter Observatory of the HDO ground state (101-000) transition observed in emission. This is the first detection of this transition in many of the sources, even if other HDO lines have been detected in the past in this sources. We present here spherically-symmetric radiative transfer modelling of this featuretogether with the published data set.
Patricio Mena	Astronomical Instrumentation in Chile	Universidad de Chile is developing instrumentation for astronomy in two areas, heterodyne receivers and photonic generation of THz radiation. Appropriate laboratories have been set for these activities. Moreover, the group is collaborating succesfully with international groups interested in setting new instrumentation in Chile. Here we will present an overview of our facilities and current projects.
		We present the analysis performed in a large suite of simulated molecular clouds to get the distributions of CO and gas temperature. In this work, we also derived brightness and excitation temperature from synthetic CO(1-0) maps, in order to help us understand how to interpret CO line emission from real molecular clouds. The simulations were performed using a fully dynamical 3D model of magnetized turbulence coupled to a chemical network

Faviola Molina	Can we trust CO emissions as a probe of the densities and temperatures of molecular clouds?	simplified to follow the dominant pathways for CO formation and destruction. We find that most of the CO is located at densities over 10^3 cm-3 where the temperature is roughly 10-40 K independently of the mean density, metallicity and UV field strength. Although most of the volume is in warmer and less dense regions, CO photodissociation is more efficient there making the CO abundance small. It follows that CO observations alone give a misleading view of the physical conditions in the clouds.
Stephen Padin	CCAT	CCAT will be a 25 m diameter Ritchey-Chretien telescope operating in the 0.2--2 mm wavelength range. It will be located at an altitude of 5600 m on Cerro Chajnantor in northern Chile. The key performance requirements for CCAT are a half wavefront error <12.5 um rms and pointing error <0.35"x(wavelength/350 um). CCAT will have an f/0.4 primary with an active surface to compensate gravitational and thermal deformations. The primary will have 162 2x2 m keystone-shaped segments, each with 16 machined aluminum tiles. The segments will be supported by a carbon-fiber-reinforced-plastic spaceframe truss on an elevation over azimuth mount made of steel. Cameras and spectrometers with up to 1 degree field of view will be located at the two f/6 Nasmyth

		foci, which will be inside the elevation axle near the tertiary. The active Nasmyth focus will be selected by rotating the tertiary. CCAT will be inside an enclosure to reduce wavefront and pointing errors due to wind forces and thermal deformation due to solar illumination.
Matthew Penrice	"Observing" Cores in Supersonic Turbulent Simulation - Can Observations Lead us to the Underlying Physics?	In an attempt to find robust measures of the physical properties of molecular clouds, this project takes numerical simulations of star forming regions and ‘observes’ them as if they were real. A two dimensional column density projection of a three dimensional simulation is produced, and a clump finding algorithm is run over the map. This separates the column density structure into many individual elliptical Gaussian cores. The cores are then plotted as mass versus radius revealing a wide range of mean core densities. The cores that harbour sink cells, presumably analogous to protostars, cluster in a well defined region of parameter space and this location can be used as an indication of the input mach number within the simulation (i.e. measuring the physical property associated with supersonic flows). This trend can be seen as the preferred habitat for protostars and could be used as an indicator for protostars in real data sets. As well, the spatial location and orientation of the cores can be used to trace filamentary structure across

		the simulation, with the densest cores living at the centers of filaments and a preferential elongation of cores along the axis of the filament. The ability to trace filaments using a clump finding algorithm will aid in the investigation of cloud structure for true observations. By analyzing the data sets in this fashion, the hope is to bridge the gap between simulation and observation to develop a set of measures that both communities can use.
Simon Radford		
Sarah Ragan	Structure and kinematics of IRDC filaments: the need for high angular resolution	We present high-resolution (3") Plateau de Bure Interferometer (PdBI) observations of infrared-dark cloud (IRDC) G011.11-0.12, in which Herschel/PACS observations reveal pre- and protostellar cores at various evolutionary stages. We detect N2H+(1-0) emission at both PACS-bright point sources and in the (younger) infrared absorption peaks. The N2H+ has narrow linewidths (0.5-1 km/s) compared to single-dish observations of the same line. In some cases, there are multiple velocity components along the line of sight, which appear as broad lines in single-dish maps. We study the kinematic structure of the filament in detail and discuss possible physical scenarios that could give rise to this emission. The continuum emission at 3mm is weak, but APEX/SABOCA

		observations at 350 micron effectively trace the dense structures. These data serve as a training set with which we can design effective large-scale surveys with CCAT and ALMA to understand the structure and kinematics of IRDC filaments.

Source URL: http://www.astro.uni-koeln.de/CologneCCAT/Program

Links:
[1] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/ALMA-CCAT.pptx
[2] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/ALMA-CCAT.pdf
[3] http://www.astro.uni-koeln.de/sites/default/files/schilke/Plume.txt
[4] http://www.astro.uni-koeln.de/ccatworkshop/talks/Fri/CCAT THz Talk.key
[5] http://www.astro.uni-koeln.de/ccatworkshop/talks/Fri/CCAT THz Talk.pdf
[6] https://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/CCAT_Intro_Glenn.pptx
[7] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/CCAT_Intro_Glenn_Updated.pdf
[8] http://www.astro.uni-koeln.de/sites/default/files/schilke/Baryshev.txt
[9] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/Baryshev-CCAT-2011.pptx
[10] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/Baryshev-CCAT-2011.pdf
[11] http://www.astro.uni-koeln.de/ccatworkshop/talks/Fri/large_arrays.odp
[12] http://www.astro.uni-koeln.de/ccatworkshop/talks/Fri/large_arrays.pdf
[13] http://www.astro.uni-koeln.de/sites/default/files/schilke/Heyer.txt
[14] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Heyer_ccat_v1.2.odp
[15] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Heyer_ccat_v1.2.pdf
[16] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/carpenter.key
[17] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/carpenter.pdf
[18] http://www.astro.uni-koeln.de/sites/default/files/schilke/Zinnecker.txt
[19] http://www.astro.uni-koeln.de/ccatworkshop/talks/Fri/Zinnecker_SOFIA_CCAT-web.pdf
[20] http://www.astro.uni-koeln.de/sites/default/files/schilke/Rubio.txt
[21] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/mrubio_ccat_5oct11.ppt
[22] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/mrubio_ccat_5oct11.pdf
[23] http://www.astro.uni-koeln.de/sites/default/files/schilke/Yorke.txt
[24] http://www.astro.uni-koeln.de/sites/default/files/schilke/Pon.txt
[25] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Cologne11Pon.pptx
[26] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Cologne11Pon.pdf
[27] http://www.astro.uni-koeln.de/sites/default/files/schilke/Kauffman.txt
[28] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Hi-GAL_CCAT-2011.ppt
[29] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Hi-GAL_CCAT-2011.pdf
[30] http://www.astro.uni-koeln.de/sites/default/files/schilke/Walsh.txt
[31] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/2011-HOPSandMALT_CCAT.pdf
[32] http://www.astro.uni-koeln.de/ccatworkshop/talks/Fri/CCAT_Cologne_Conf_Summary.pdf
[33] http://www.astro.uni-koeln.de/sites/default/files/schilke/Kritsuk.txt
[34] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Kritsuk_CCAT2011_1.ppt
[35] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Kritsuk_CCAT2011_1.pdf

[36] http://www.astro.uni-koeln.de/sites/default/files/schilke/Andre.txt
[37] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/ph_andre_ccat_cologne_oct2011_ed.pdf
[38] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/HIFI_lessons_CCAT_Volker111005.pdf
[39] http://www.astro.uni-koeln.de/sites/default/files/schilke/Endo.txt
[40] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Endo_1110Koeln.pdf
[41] http://www.astro.uni-koeln.de/sites/default/files/schilke/Shinnaga.txt
[42] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/20111005_Cologne_HS_rev2_ext_forweb.key
[43] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/20111005_Cologne_HS_rev2_ext_forweb.pdf
[44] http://www.astro.uni-koeln.de/sites/default/files/schilke/Wyrowski.txt
[45] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/atlasgal-ccat.pdf
[46] http://www.astro.uni-koeln.de/sites/default/files/schilke/Klein.txt
[47] http://www.astro.uni-koeln.de/sites/default/files/schilke/Bally.txt
[48] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/2011_CCAT_Cologne_BGPS.ppt
[49] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/2011_CCAT_Cologne_BGPS.pdf
[50] http://www.astro.uni-koeln.de/sites/default/files/schilke/Dobbs.txt
[51] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/dobbs_cologne.key
[52] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/dobbs_cologne-web.pdf
[53] http://www.astro.uni-koeln.de/sites/default/files/schilke/Herpin.txt
[54] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/WISH_Köln.key
[55] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/WISH_Köln.pdf
[56] http://www.astro.uni-koeln.de/sites/default/files/schilke/Hennemann.txt
[57] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/MHennemann_CCAT2011.pptx
[58] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/MHennemann_CCAT2011.pdf
[59] http://www.astro.uni-koeln.de/sites/default/files/schilke/Pagani.txt
[60] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Ortho_H2_CCAT_Koeln_2011.pptx
[61] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/Ortho_H2_CCAT_Koeln_2011.pdf
[62] http://www.astro.uni-koeln.de/sites/default/files/schilke/Fuller.txt
[63] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/fuller-irdcs.odp
[64] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/fuller-irdcs.pdf
[65] http://www.astro.uni-koeln.de/sites/default/files/schilke/Glover.txt
[66] http://www.astro.uni-koeln.de/ccatworkshop/talks/Glover-CCAT.key
[67] http://www.astro.uni-koeln.de/ccatworkshop/talks/Glover-CCAT.pdf
[68] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/walter_ccat_oct11_small.pdf
[69] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/HI-H2-Transition_Cologne_2.ppt
[70] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/HI-H2-Transition_Cologne_2.pdf
[71] http://www.astro.uni-koeln.de/sites/default/files/schilke/Staguhn.txt
[72] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/GISMO_Koeln_Oct_2011.ppt
[73] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/GISMO_Koeln_Oct_2011.pdf
[74] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/Gerin-Cologne-fin-2.ppt
[75] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/Gerin-Cologne-fin-2.pdf
[76] http://www.astro.uni-koeln.de/sites/default/files/schilke/Schneider.txt
[77] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/koeln_05102011.pptx
[78] http://www.astro.uni-koeln.de/ccatworkshop/talks/Wed/koeln_05102011.pdf
[79] http://www.astro.uni-koeln.de/sites/default/files/schilke/Mangum.txt
[80] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/DensitometryThermometryStarburst-CCAT-web.ppt
[81] http://www.astro.uni-koeln.de/ccatworkshop/talks/Thu/DensitometryThermometryStarburst-CCAT.ppt-web.pdf