
NAME : Baselmans, Jochem
INSTITUTE : SRON Netherlands Institute for Space Research
EMAIL : j.baselmans@sron.nl
TITLE : Large format, background limited arrays of Kinetic Inductance Detectors for sub-mm astronomy
ABSTRACT :
We present the development of large format imaging arrays for sub-mm astronomy based upon microwave Kinetic Inductance detectors and their read-out. In particular we focus on the arrays developed for the A-MKID instrument for the APEX telescope. AMKID contains 2 focal plane arrays, covering a field of view of 15'x15'. One array is optimized for the 350 GHz telluric window, the other for the 850 GHz window. Both arrays are constructed from four 61 x 61 mm detector chips, each of which contains up to 3400 detectors and up to 880 detectors per readout line. The detectors are lens antenna coupled MKIDs made from NbTiN and Aluminium that reach photon noise limited sensitivity in combination with a high optical coupling. The lens-antenna radiation coupling enables the use of 4K optics and Lyot stop due to the intrinsic directivity of the detector beam, allowing a simple cryogenic architecture. We discuss the pixel design and verification, detector packaging and the array performance. We will also discuss the readout system, which is a combination of a digital and analog back-end that can read-out up to 4000 pixels simultaneously using frequency division multiplexing.

NAME : Basu, Kaustuv
INSTITUTE : University of Bonn
EMAIL : kbasu@astro.uni-bonn.de
TITLE : Galaxy cluster astrophysics and cosmology from a large aperture sub-millimeter telescope
ABSTRACT :
A large aperture sub-millimeter telescope placed in the ALMA plateau will present unique opportunities to conduct galaxy cluster astrophysics and cosmology via the Sunayev-Zel'dovich effect. The main advantage is performing multi-band high-sensitivity total power measurements with bolometer cameras consisting of the order 10k detector elements. This will enable wide area "SZ spectroscopy" to provide information on the temperature and peculiar motions of the intracluster medium, as well as support a clear separation of the various SZ signals in presence of Galactic and extragalactic foregrounds. I will summarize what is currently possible in this kind of analysis using the full-mission Planck data, what we can do in the near future with CMB-S4 prototype telescopes like the CCAT-prime, and what AtLAST can offer by adding the element of higher angular resolution.

NAME : Bertoldi, Frank
INSTITUTE : Bonn
EMAIL : bertoldi@uni-bonn.de
TITLE : The Atacama Large Aperture Submm/mm Telescope (AtLAST) Project
ABSTRACT :

NAME : De Breuck, Carlos
INSTITUTE : ESO Garching
EMAIL : cdebreuc@eso.org
TITLE : Site Considerations for AtLAST
ABSTRACT :
We will present a report from the Site Selection Working Group breakaway sessions.

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NAME : Endo, Akira
INSTITUTE : Delft Universtiy of Technology
EMAIL : a.endo@tudelft.nl
TITLE : First light of DESHIMA on ASTE: on-chip filterbank spectrometer for submillimeter wave astronomy
ABSTRACT :
An ultra-wideband, large field-of-view (sub)mm wave imaging spectrograph on a large ground based telescope is imperative for uncovering the evolution of dust-enshrouded cosmic star formation rate, galaxy evolution, and structure formation, over cosmic time back to the epoch of reionization. Here, we report the first on-sky operation of an on-chip filterbank spectrometer DESHIMA (Deep Spectroscopic High-z Mapper) on the 10 m ASTE telescope. Being in its phase-1 configuration, DESHIMA covered the 330-370 GHz band with 49 spectral channels, offering a spectral resolution of F/dF = 400. The KIDs are operated at 120 mK with a 2-stage ADR refrigerator, and their response is read out using the SpaceKIDs readout electronics. This design is intended as a scalable prototype towards the phase-2 DESHIMA instrument (target band 240-720 GHz and 2 spatial pixels.) After a successful installation on ASTE in Oct 2017, DESHIMA has detected multiple astronomical sources in both continuum and line emission. At the workshop we will report on the on-sky performance, and the lessons learned during the first operation of an on-chip filterbank spectrometer on a telescope.

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NAME : Geach, Jim
INSTITUTE : University of Hertfordshire
EMAIL : j.geach@herts.ac.uk
TITLE : Co-Lead of science WG
ABSTRACT :
We will present a report from the Science Working Group breakaway sessions.

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NAME : Graf, Urs
INSTITUTE : University of Cologne
EMAIL : graf@ph1.uni-koeln.de
TITLE : Heterodyne Array Receiver Development at KOSMA
ABSTRACT :
We present our recent developments for the large format heterodyne array spectrometer CHAI. Operating simultaneously in two wavelength bands (650 um and 350 um) with 64 pixels, CHAI will be used for efficient large scale spectroscopic mapping with the CCAT-prime telescope, which is under construction on Cerro Chajnantor/Chile. The receiver is based on the technology developed for SMART, one of the first submillimeter heterodyne arrays and for upGREAT, the world's leading Terahertz array receiver.

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NAME : Hargrave, Peter
INSTITUTE : Cardiff University School of Physic & Astronomy

EMAIL : hargravepc@cardiff.ac.uk
TITLE : AtLAST telescope design working group overview
ABSTRACT :
AtLAST telescope design working group overview

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NAME : Johnstone, Douglas
INSTITUTE : NRC-Herzberg
EMAIL : doug.johnstone@nrc-cnrc.gc.ca
TITLE : Time-Domain Sub-mm Astronomy. Measuring the Accretion Variability of Deeply Embedded Protostars.
ABSTRACT :
During the protostellar phase of stellar evolution, accretion is expected to be variable, but this variability has been difficult to detect because protostars are deeply embedded. We have undertaken a 3-year dedicated JCMT/SCUBA-2 monitoring program of eight nearby star-forming regions (Herczeg et al. 2017) to search for sub-mm brightness variations as a proxy of episodic accretion. Here, we describe a sub-mm luminosity burst of the Class I protostar EC 53 in Serpens Main (Yoo et al. 2017). The change in sub-mm brightness of EC 53 is interpreted as dust heating in the envelope, generated by a luminosity increase of the protostar. The sub-mm lightcurve resembles the historical K-band lightcurve, which varies by a factor of ~6 with a 543 period and is interpreted as accretion variability excited by interactions between the accretion disk and a close binary system. We further compare archival SCUBA-2 observations against the first year of our survey (Mairs et al. 2017) and perform a statistical analysis of the first eighteen months of the survey (Johnstone et al. 2017). We conclude that greater than 5% of the known deeply embedded protostars are found to vary in the sub-mm.

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NAME : Kärcher, Hans J.
INSTITUTE : MT Mechatronics
EMAIL : hans@hjkaercher.de
TITLE : Contractors Aspects of Telescope Design
ABSTRACT :
The paper presents ideas and comments on the design of large terahertz telescopes of different sizes (10-12m, 25-40m, 50-100m) with the focus on optical layout (reflector arrangement, focal ratio, field of view, placement of receivers), related structural and mechanical aspects (reflector surface, backup structure, mount, environmental protection) and realization (manufacture, erection at a very high site). The ideas and comments are based on 40 years of professional experience of the author as lead system engineer on contractors side for a large number of telescope projects, radio as well as optical. The paper will be concluded by an overview on existing technologies, their related technical limits and related cost issues. The author understands the astronomers as “customers”, who define the telescope project by their Science Case. The first telescope ideas should be interpreted as “reference design” and should give to the contractors an adequate freedom for finding the ”final design” based on practical experience in regard of performance as well as costs.

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NAME : Kauffmann, Jens
INSTITUTE : MIT Haystack
EMAIL : jens.kauffmann@gmail.com
TITLE : Cosmic Star Formation --- Seen from the Milky Way with AtLAST Short Contributed Talk
ABSTRACT :

Herschel and Spitzer provided first truly unbiased overviews of star formation environments in the Milky Way. Today, high–powered instruments like ALMA additionally resolve the immediate birth environments of individual stars in a few selected regions throughout the Galaxy. This progress in the Milky Way is important, because the same facilities also allow us to explore how galaxies evolved over time. Was star formation more efficient in the dense molecular clouds found in starburst galaxies? Why do galaxies often follow star formation relations like those from Kennicutt & Schmidt and Gao & Solomon? A cloud-scale understanding of the star formation processes, that can only be developed in the Milky Way, is necessary to make progress. Unfortunately, ALMA can resolve the detailed substructure only in SELECTED galactic molecular clouds, given mapping with ALMA is very slow. Here I show how surveys of dust continuum and line emission provided by a large and fast single–dish telescope can overcome these critical limitations, e.g. by breaking degeneracies in current theoretical models. My discussion draws on a white papers previously developed for similar telescopes.

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NAME : Kawabe, Ryohei
INSTITUTE : NAOJ
EMAIL : ryo.kawabe@nao.ac.jp
TITLE : New 50-m-calss single dish telescope: Large Submillimeter Telescope(LST)
ABSTRACT :
We report on the plan to construct a 50 m class millimeter (mm) and sub-mm single dish telescope, the Large Submillimeter Telescope (LST). The telescope is optimized for wide-area imaging and spectroscopic surveys in the 70 to 420 GHz main frequency range, which just covers main atmospheric windows at millimeter and submillimeter wavelengths for good observing sites such as the ALMA site in Chile. We also target observations at higher frequencies of up to 1 THz, using an inner part high-precision surface. Active surface control is required in order to correct gravitational and thermal deformations of the surface. The LST will facilitate new discovery spaces such as wide-field imaging with both continuum and spectral lines, along with new developments for time domain science. With exploiting synergy with ALMA and other telescopes, LST can contribute to a wide range of topics in astronomy and astrophysics, e.g., astrochemistry, star formation in the Galaxy and galaxies, evolution of galaxy clusters via SZ effect. We also report the recent progress on the technical study, e.g., the tentative study of the surface error budget and challenges to correction for the wind-load effect.

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NAME : Klaassen, Pamela
INSTITUTE : UK Astronomy Technology Centre
EMAIL : pamela.klaassen@stfc.ac.uk
TITLE : Galactic Science Case for AtLAST
ABSTRACT :
We will present a report from the Science Working Group breakaway sessions.

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NAME : Kohno, Kotaro
INSTITUTE : The University of Tokyo
EMAIL : kkohno@ioa.s.u-tokyo.ac.jp
TITLE : Blind spectroscopic galaxy surveys using an ultra-wide-band imaging spectrograph on AtLAST and LST
ABSTRACT :
A novel approach to elucidation of cosmic star formation history is a blind search for CO and [CII] emissions using a ultra-wide-band imaging spectrograph on the future large submm telescopes like AtLAST and LST. In particular, searching for [CII] emitters in the appropriate frequency range allows us to sample those sources very efficiently for a redshift range of 3.5 to 9 (190 to 420 GHz),

reaching the star-formation in the EoR. Further, spectroscopic analysis of CO in the lower frequency bands will constrain the evolution of CO luminosity functions across cosmic time. We conducted a feasibility study of ``CO/[CII] tomography'' based on a mock galaxy catalog containing 1.4 million objects drawn from the S^3-SAX (Obreschkow et al.~2009). We find that a blind spectroscopic survey using a 50-m telescope equipped with a 100-pixel imaging spectrograph, which covers 70--370 GHz simultaneously, will be promising indeed. A survey of 2 deg^2 in 1,000 hr (on-source) will uncover > 10^5 line-emitting galaxies in total, including ~10^3 [CII] emitters in the EoR (Tamura et al., in prep.). Wider surveys (10 deg^2 or wider) will also be discussed for RSD science cases.

NAME : Lagache, Guilaine
INSTITUTE : LAM - Laboratoire d'Astrophysique de Marseille
EMAIL : guilaine.lagache@lam.fr
TITLE : Continuum and line emission of star-forming galaxies and development of a new sub-mm IFU
ABSTRACT :
Nowadays, most of the constraints on the dusty star formation at high z comes from deep continuum surveys. We developed a new simulation of the dusty extragalactic sky with a realistic clustering. The comparison between single-dish and interferometric data showed that the clustering inside the beam of a single-dish instrument can seriously bias their measurements. Fortunately, these simulations also show that the beam of a >30-meter dish in the mm should not be affected by serious multiplicity effects. We will give predictions for important characteristics of future AtLAST surveys (as confusion limit, number of detections, properties of detected galaxies). These simulations can also include line emission to prepare a future sub-mm low-resolution spectroscopic survey at high z with AtLAST. Such a survey could be built on the legacy of the CONCERTO survey, that will map the fluctuations of the CII line intensity in the reionisation and post-reionisation epoch. A "super-CONCERTO" instrument on AtLAST would be a perfect first-light instrument to unveil the gigantic potential of this telescope.

NAME : Matsushita, Satoki
INSTITUTE : Academia Sinica Institute of Astronomy and Astrophysics
EMAIL : satoki@asiaa.sinica.edu.tw
TITLE : What we have learned from the ALMA Long Baseline Campaigns
ABSTRACT :
I present mm/submm phase characteristics measured at the ALMA long baseline campaigns, and suggestions to a large aperture submillimeter telescope. All the measured spatial structure function (SSF) show that the phase fluctuation increases as a function of baseline length, with a power-law slope of ~0.6 up to around 1 km. In many cases, the slope becomes shallower (average of ~0.2-0.3) at baseline lengths longer than around 1 km, namely showing a turn-over in SSF, but in some rare cases, the slope keep the same from short baselines to long baselines. This characteristics affects the site selection of the single-dish telescopes that may correlate with ALMA. Furthermore, for a large aperture submillimeter telescope, short baseline phase characteristics affect its pointing, known as the anomalous refraction. I will also mention about this effect based on the ALMA Long Baseline Campaign data.

NAME : Monfardini, Alessandro
INSTITUTE : CNRS Grenoble
EMAIL : monfardini@neel.cnrs.fr
TITLE : The NIKA2 large field-of-view millimeter continuum camera for the 30-m IRAM telescope
ABSTRACT :

We have constructed and deployed a multi-thousands pixels dual-band (150 and 260 GHz, respectively 2mm and 1.15mm wavelengths) camera to image an instantaneous field-of-view of 6.5arc-min and configurable to map the linear polarization at 260GHz. We are providing a detailed description of this instrument, named NIKA2 (New IRAM KID Arrays 2), in particular focusing on the cryogenics, the optics, the focal plane arrays based on Kinetic Inductance Detectors (KID) and the readout electronics. We are presenting the performance measured on the sky during the commissioning runs that took place between October 2015 and April 2017 at the 30-meter IRAM (Institut of Millimetric Radio Astronomy) telescope at Pico Veleta, and preliminary science-grade results.

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NAME : Mroczkowski, Tony / Noorozian, Omid
INSTITUTE : ESO Garching / NRAO Charlottesville
EMAIL : amroczko@eso.org / onorooz@nrao.edu
TITLE : AtLAST instrumentation considerations and overview
ABSTRACT :
We will present a report from the Instrumentation Working Group breakaway sessions.

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NAME : Reveret, Vincent
INSTITUTE : CEA Saclay - Astrophysics
EMAIL : vincent.reveret@cea.fr
TITLE : The polarization-sensitive bolometers for SPICA and their potential use for ground-based application
ABSTRACT :
CEA is leading the development of Safari-POL, an imaging-polarimeter aboard the SPICA space observatory (ESA M5). SPICA will be able to reach unprecedented sensitivities thanks to its cooled telescope and its ultra-sensitive detectors. The detector assembly of Safari-POL holds three arrays that are cooled down to 50 mK and correspond to three spectral bands : 100, 200 and 350 microns. The detectors (silicon bolometers), benefit from the Herschel/PACS legacy and are also a big step forward in term of sensitivity (improved by two orders of magnitude compared to PACS bolometers) and for polarimetry capabilities. Indeed, each pixel is intrinsically sensitive to two polarization components (Horizontal and Vertical). We will present the Safari-POL concept, the first results of measurements made on the detectors, and future plans for possible ground-based instruments using this technology. We will also present the example of the ArTéMiS camera, installed at APEX, that was developed as a ground-based counterpart of the PACS photometer.

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NAME : Riechers, Dominik
INSTITUTE : Cornell University
EMAIL : riechers@cornell.edu
TITLE : CCAT-prime
ABSTRACT :

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NAME : Schilke, Peter
INSTITUTE : University of Cologne
EMAIL : schilke@ph1.uni-koeln.de
TITLE : GEco - Galactic Science with CCAT-p
ABSTRACT :
The CCAT-p telescope will be a 6m telescope built on Cerro Chajnantor, at an altitude of 5600 m. While a significant portion of the CCAT-p science is dedicated to Galaxy formation or Cosmology,

there is also important Galactic Science the instrument can do. In this talk, I will summarize the science we envision to perform mostly with the heterodyne CHAI array: a survey of the Galactic Plane and the Magellanic Clouds in atomic carbon, searching for turbulence dissipation structures in Gould belt clouds, and searching for protostellar variability.

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NAME : Schuster, Kar-Friedrich
INSTITUTE : IRAM
EMAIL : schuster@iram.fr
TITLE : Applicable Lessons from the IRAM 30m Telescope
ABSTRACT :
The IRAM 30m telescope is operated in the 70 to 375 GHz range since over 30 years. It is among the most successful radio telescopes ever built. We describe the key ingredients of design, operation, maintenance and instrumentation which enabled this success and at the same time line out some weaknesses and limitations. The science drivers and their change over time are shortly recalled and finally we present and discuss future paths for upgrades.

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NAME : Spinoglio, Luigi
INSTITUTE : Istituto di Astrofisica e Planetologia Spaziali - IAPS
EMAIL : Luigi.Spinoglio@iaps.inaf.it
TITLE : Ground-based submillimeter spectroscopic cosmological surveys and synergies with space FIR surveys
ABSTRACT :
To study the dust obscured processes of both star formation and black hole accretion during galaxy evolution and establish their role, as well as their mutual feedback processes, rest frame IR to submillimeter spectroscopy is needed. At these frequencies dust extinction is at its minimum and a variety of atomic and molecular transitions, tracing most astrophysical domains, occur. A large ground based submillimeter telescope with a large field of view and high sensitivity in the TeraHertz domain will pave the way of future FIR space telescope missions, such as SPICA in the late 2020's and the Origins Telescope later. I will present predictions demonstrating the synergies of such instruments to fully understand galaxy evolution, during its obscured phase, which has built most of the stellar populations in galaxies.

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NAME : Staguhn, Johannes
INSTITUTE : John Hopkins University & NASA/GSFC
EMAIL : johannes.staguhn@nasa.gov
TITLE : The Origins Space Telescope (OST)
ABSTRACT :
The Origins Space Telescope is the mission concept for the Far-Infrared Surveyor, one of the four science and technology definition studies to be submitted by NASA Headquarters to the 2020 Astronomy and Astrophysics Decadal survey. The observatory will provide orders of magnitude improvements in sensitivity over prior missions, in particular for spectroscopy, enabling breakthrough science across astrophysics. The observatory will cover a wavelength range between 5 μm and 600 μm in order to enable the study of the formation of proto-planetary disks, detection of bio-signatures from extra-solar planet's atmospheres, characterization of the first galaxies in the universe, and many more. The five instruments that are currently studied are two imaging far-infrared spectrometers using incoherent detectors, providing up to R~10^5 spectral resolution, one far-infrared infrared heterodyne instrument for even higher spectral resolving powers, one far-infrared continuum imager and polarimeter, plus a mid-infrared coronagraph with imaging and spectroscopy mode. I will describe the scientific and technical capabilities of the observatory with focus on the expected synergies with AtLAST.

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NAME : Testi, Leonardo
INSTITUTE : ESO Garching
EMAIL : ltesti@eso.org
TITLE : Overview of ESO Large Single Dish Study
ABSTRACT :
In this talk I will briefly summarize the motivation, methodology and outcome of the ESO Submm Single Dish Strategy WG. The WG was established by the ESO Director for Science and completed its work at the end of 2015. I will summarize the status of the report recommendations, which, among other things, led to the organization of the AtLAST workshop.

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NAME : Tilanus, Remo
INSTITUTE : Leiden Observatory
EMAIL : rtilanus@strw.leidenuniv.nl
TITLE : ATLAST operational considerations and overview
ABSTRACT :
We will present a report from the Operational Working Group breakaway sessions.

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NAME : Wagg, Jeff
INSTITUTE : SKAO Jodrell Bank Observatory
EMAIL : j.wagg@skatelescope.org
TITLE : Prospects for future synergies between SKA and AtLAST
ABSTRACT :
The Square Kilometre Array will be the next major global radio astronomy observatory. Being built in two phases, the first phase will consist of a low frequency array in Australia and a mid to high frequency array of dishes in the Karoo of South Africa. The design of SKA1 is nearly complete with the expectation that construction should begin within the next two years. A significant fraction of the observing time on both SKA1-MID and SKA1-LOW will likely be devoted to large survey programmes covering a broad range of science objectives. Given the timeline for these SKA1 programmes to be completed, it is anticipated that they could naturally complement future high frequency surveys using AtLAST. I will highlight a few areas where such synergies should exist.

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NAME : Wyrowski, Friedrich
INSTITUTE : MPIfR
EMAIL : wyrowski@mpifr-bonn.mpg.de
TITLE : The role of APEX as a pathfinder for ATLAST
ABSTRACT :
Now more than 12 years in operation, the Atacama Pathfinder Experiment (APEX) 12 m submillimeter telescope has significantly contributed to a wide variety of submillimeter astronomy science areas, ranging from the discoveries of new molecules to large and deep imaging of the submillimeter sky. While ALMA operation is in full swing, APEX is strengthening its role not only as pathfinder for studying large source samples and spatial scales to prepare detailed high angular resolution ALMA follow ups, but also as fast response instruments to complement new results from ALMA. Furthermore, APEX ensures southern hemisphere access for submillimeter projects complementing archival Herschel research as well as new SOFIA science. With new broadband and multipixel receivers as well as large cameras for wide-field continuum imaging, APEX will pave the way towards the science envisioned with ATLAST. In this contribution, the current status and

ongoing upgrades of APEX will be discussed, with an emphasis on the importance of continuous cutting edge science and state-of-the-art instrumentation that will bridge the gap towards ATLAST.