Conference abstracts

Rebecca AZULAY ROMERO
Universidad de Valencia, Spain

Binary stars in loose associations: towards a calibration of PMS models.

Precise determinations of dynamical masses of pre-main-sequence (PMS) stars are necessary to calibrate PMS stellar evolutionary models, whose predictions are in disagreement with measurements for masses below 1.2 M_{sun}. Binary stars in young, nearby loose associations are particularly good candidates, since all members share a common age. We will report on VLBI observations of several binaries (within the ABDor system) directed to determine their absolute and relative orbital motion; plans to extend our survey to new, nearby binaries will be presented. This project would provide precise calibration points for testing PMS models of low-mass stars.

Alejandro BAEZ RUBIO
Centro de Astrobiologиa (INTA-CSIC), Spain

Radio-recombination line (RRLs) as a key tool to unveil the kinematics of the ionized envelopes toward ultracompact-HII regions.

Radio-recombination lines are excellent probes of the kinematics of the ionized gas in ultracompact (UC) H II regions. The strong maser lines detected toward MWC349A along with the use of a 3D-non LTE radiative transfer model have provided strong constraints on its ionized outflow and circumstellar disk. Thus, today its circumstellar disk is one of the few well established disks toward a massive star. This is an excellent proof of how RRL masers could be a key tool to unveil the kinematics of the poorly understood kinematics of ionized envelopes (disks and outflows) around massive stars, above all after the recent detection of RRL masers toward other dense ultracompact HII regions such as MonR2 and Cepheus A HW2.

Thus, we present the most relevant physical characteristics of the RRL maser emission incorporated in the radiative transfer model known as MORELI used to constrain physical and kinematics features of the ionized envelopes of MWC349A, MWC349A and MonR2. Finally we show the most relevant progress in the field of RRL masers over the last years.

Olga BAYANDINA
Astro Space Center of Lebedev Physical Institute RAS, Moscow State Pedagogical University, Russia

The similarities and differences in the formation of masers on methanol and OH according to data from radio astronomy observations

The analysis of the observational properties of methanol masers and OH masers are presented. The main goal of the project is searching of any association between I class methanol maser emission, which is formed, according to modern concepts, under the influence of collisional pumping mechanism, and different elements (agents) of the interstellar medium, probably reinforcing the effect of this mechanism. Research methods are statistical analysis of the data and carrying out radio astronomical observations.

We considered the following possibilities: the impact of bipolar outflows (large-scale motion of matter that accompanies the process of emergence and evolution of stars), the phenomenon of self-gravitation in clusters of protostellar condensations, the effect of shock waves from supernova remnants and possible influence of magnetic fields on maser condensations emitting in the lines of methanol and hydroxyl.

The analysis based on the data of our own class I methanol maser catalog, own observations on RT-70 radio telescope (Yevpatoria, Ukraine), archival data of the OH observations with the Nanэay Radio Telescope (France), and archival data from the infrared telescope of space mission Spitzer.

We show that the impact of considered factors on isolated prestellar gas-dust clumps may play a key role in the provocation an emergence of maser effects in the interstellar medium.

Tatiana BOCANEGRA BAHAMON
Joint Institute for VLBI in Europe, the Netherlands

Space Applications of Planetary Radio Interferometry and Doppler Experiment (PRIDE)

The Planetary Radio Interferometry and Doppler Experiment (PRIDE) is an initiative developed at the Joint Institute for VLBI in Europe (JIVE) in the Netherlands. PRIDE combines the VLBI phase-referencing and Doppler tracking techniques in an integrated scientific tool for an `ultra-precise' estimation of the state vectors of a particular planetary spacecraft. These estimates can be used for a variety of scientific applications providing an enhancement of the mission's science return, with a minimal set of requirements on the on-board instrumentation. Among these applications are planetary atmospheric studies and planetary gravimetry.

By tracking ESA's VEX the PRIDE-team is participating in the so-called Venus Express Atmospheric Drag Experiment (VExADE) campaigns. In each campaign, the VEX's orbit pericenter is lowered into the altitude range of 165 - 175 km in order to probe Venus upper atmosphere above its North pole. The first VExADE campaigns were carried out between 2009-2010 using Doppler tracking data acquired by the VEX radio science experiment (VeRa), which provided the first in situ measurements of the density of Venus' polar thermosphere at solar minimum conditions. The next campaigns will take place throughout this year, which will allow monitoring the density of the polar upper thermosphere along the increasing phase of the solar cycle, and to provide a wider data set of density estimates which will contribute to the construction of a new empirical model of Venus' polar thermosphere.

Another planetary science application derived from spacecraft tracking is gravimetry. By tracking a spacecraft along its orbit around planets or moons within the Solar system, the parameters that describe the central body's gravitational field can be determined. The PRIDE-team intends to participate in such experiments within the framework of the JUICE mission to study the Jovian system. JUICE's spacecraft will perform several fly-bys around Callisto, Europa, and will finally embark on an eight month orbit around Ganymede. All these events will provide a unique opportunity to study these moons' interiors by means of gravimetry.

In this presentation, the previous, current and future activities of our group regarding planetary exploration will be presented.

Anastasiya BOIKO
Institute of Radio Astronomy of National Academy of Sciences of Ukraine, Ukraine

Search of the flare star radio emission in the frequency range of 16.5 – 33 MHz

Observations of the two M-dwarf flare stars (AD Leonis and EV Lacertae), which were carried out with the radio telescope UTR-2 (Kharkov, Ukraine) at decameter wavelengths, are presented. More than 200 events of radio emission from these stars were detected during the 2009 – 2011 observational campaings. The flare star radio emission was registered using ON-OFF regime of observations. Events in the form of bursts were considered with confidence as stellar emission. The morphology of the flare star events is considered and their parameters (frequency drift rates, durations, fluxes) are analyzed.

Alexander BUTENKO
Pushchino Radio Astronomy Observatory ASC LPI RAS, Russia

Search of giant radiogalaxies on the declinations from 3.5 to 12.5 degrees

Identification of the strong sources observed on radio telescope Large Phase Array (Pushchino) at 110.6 MHz was carried out with another catalogs. A large discrepancy in two sources were found between the estimated and expected flux densities on the basis of the integral spectra. More probable explanation for the observed sources is that they are radio galaxies with large angular sizes. Expected size of these sources is more than 20 arc minutes.

Maciej CEGLOWSKI
Torun Centre for Astrophysic, Nicolaus Comernicus University, Poland

A survey of Compact Complex Morphology Radio (CCMR) sources

The evolutionary scheme in which younger and smaller Gigahertz-Peaked Spectrum (GPS) and Compact Steep Spectrum (CSS) sources become large scale radio structures is now considered a standard model. Nevertheless, there are examples of radio sources that do not follow this trend. It has been suggested by many authors that among young and small GPS and CSS sources there should exists a number of small scale radio structures that are dying, frustrated or restarted. Numerous reasons for this are suggested including merging, jet - medium interaction or accretion instabilities in disk. In our recent studies we focused on searching for such Compact Complex Morphology Radio (CCMR) sources. Using publicly available S-band and X-band images from VLBA Calibrator Surveys we have created a sample of 10 CCMR sources. Based on the collected radio images and information from the literature we preliminary classified the selected sources as those showing restarted activity and those indicating rather jet-medium interaction. One of the sources is a good candidate for young X-shaped radio object. We will discuss here the results of our studies made so far, their implications for evolution theory of radio-loud AGNs and future plans.

Colm COUGHLAN
University College Cork, Ireland

MEM and CLEAN Imaging of 18-22cm VLBA Polarisation Observations of Compact Active Galactic Nuclei

We are in the process of obtaining VLBA polarisation data for the 135 MOJAVE-I Active Galactic Nuclei at four wavelengths in the 18-22cm band. Some results from the first 3 of 9 observations are presented. These observations enable studies of the evolution of the intensity and magnetic-field structures of these AGN jets as they propagate from parsec to kiloparsec scales, as well as studies of the thermal plasma present in the vicinity of the jets on these scales, manifest via Faraday rotation. A wide range of other multi-wavelength studies can also be carried out using these data. Both CLEAN and MEM (maximum entropy method) imaging techniques are used and the advantages of using both is demonstrated.

Dmitry DUEV
Joint Institute for VLBI in Europe, the Netherlands

Ultra Near-Field VLBI Experiments

Astrometric near-field VLBI observations of spacecraft can be used to address a variety of scientific applications, both fundamental and applied. In particular, a better link between the Terrestrial and Celestial reference frames can be established by means of direct VLBI-tracking of GLONASS satellites. Apart from this, VLBI observations of RSA's (Russian Space Agency) space radio telescope RadioAstron as a target can significantly improve the orbit determination of the spacecraft - a factor critically important for the success of the whole mission.

In this talk, we present the pipeline for processing and analysis of the near-field VLBI observations of spacecraft developed at the Joint Institute for VLBI in Europe (Dwingeloo, The Netherlands) within the PRIDE (the Planetary Radio Interferometry and Doppler Experiment) initiative. Results of the test experiments with GLONASS satellites and RadioAstron spacecraft aimed to address the above-mentioned problems are presented as well.

Christian FROMM
Max Planck Institute for Radio Astronomy, Germany

Spectral Evolution in Blazars

The spectral evolution in Blazars is presently being studied in the high energy regime (X-rays to Gamma-rays) and explained by single zone models within conical jets. In contrast to these studies, we concentrate on the spectral evolution in the radio regime, using single dish and high-resolution multi-frequency VLBI observations. We present the analysis of multi-band light curves and high-resolution VLBI observations from which we extracted the temporal and spatial evolution of the physical parameters and tested the shock-in-jet model.

In order to better understand the highly non-linear effects involved in the spectral evolution we perform several eRHD simulations. In the second part of my talk I will present first results these simulations and discuss the influence of energy losses on the observed emission.

Katinka GEREB
Kapteyn Astronomical Institute, the Netherlands

The global HI properties of galaxies up to z ~ 0.1

We use stacking techniques in order to study the global HI properties of galaxies in the Lockman Hole area (~6 square degrees) observed with the Westerbork Synthesis Radio Telescope (WSRT). Redshifts and sky positions indispensable for stacking are provided by the SDSS database along with other galaxy parameters (such as colour, line fluxes, size), that we use to constrain the nature of our sources.

The large redshift range $0 < z < 0.09$ covered by the observation is divided into three bins, then from the stacked profiles HI gas masses are evaluated in each bin for galaxies with various properties.

Cross-correlation of the Lockman Hole continuum data with the SDSS database resulted in a catalogue of mJy and sub-mJy radio sources. In order to learn about the relative contribution of AGN/star-formation for the radio regime in this low-power radio population, we classify the sample based on optical line ratio diagrams and additional infrared information. Stacking is then used to probe the HI content of these sources with regard to their AGN and star-formation properties, and to compare the HI characteristics of non-radio/radio-associated Lockman Hole galaxies.

Svetlana GLUBOKOVA
Pushchino Radio Astronomy Observatory ASC LPI RAS, Russia

Estimation of plasma turbulence parameters by observations of radio-source interplanetary scintillations

We report the first results of interplanetary scintillation observations of compact radio sources during one year 2011-2012. The observations was performed with the Large Phased Array antenna of the Lebedev Institute of Physics RAS at frequency of 111 MHz. The estimates of solar wind velocities, the angular sizes of compact radio sources and the parameters of the plasma turbulence have been obtained using temporal scintillation power spectra. The distribution of the source angular sizes and the turbulence spectral index are presented.

Anatoliy GLYANTSEV
Pushchino Radio Astronomy Observatory ASC LPI RAS, Russia

The refractive and diffractive scintillation of the source B0531+194

The results of interplanetary scintillation observation of the source B0531+194 in the range of elongation from 10 to 70 degrees are presented. Observations were carried out by the radio telescope BSA at the frequency of 111 MHz in the period from June to August 2011. The dependence of scintillation index on elongation was obtained with the pronounced maximum at the source solar offset about 20^{o} separating regions of weak and saturated scintillations. IPS temporal power spectra shows both, diffraction and refraction scintillation, at small elongations. IPS temporal power spectra in the diffraction range shows sharp steepening at high frequency. Break frequency at small elongation is independent on elongation that means that spectral break is defined by the finite source angular size. Our data are consistent with the source angular size about 0.2 arc. sec.

Fiona HEALY
University College Cork, Ireland

Multi-epoch 18-22cm VLBA Observations of Several AGNs

VLBA polarization observations of the 135 AGNs in the MOJAVE-I sample have recently been obtained at four frequencies between 1.3 and 1.7 GHz. These observations are sensitive to compact radio emission on scales from a few to tens of parsecs from the VLBA core. VLBA observations at the same frequencies were obtained earlier for 34 BL Lac objects, enabling a multi-epoch study of the extended radio jets of these objects. As an initial step in this study, we have constructed new images for three BL Lac objects with rich jet structures: 0735+178, 1803+784 and 2200+420 (BL Lac), which are analyzed together with the previous results of Hallahan and Gabuzda (2008). We consider the morphology, polarization (magnetic field) structure and Faraday rotation distributions of these objects, as well as their time variability.

Katharina IMMER
Max-Planck-Institut fuer Radioastronomie, Germany

The massive star forming complex W33 - Closer than expected?

The massive star forming complex W33 consists of several molecular clouds in different stages of star formation, from quiescent, infrared-dark clouds to highly active HII regions. Ammonia and radio recombination line observations show two velocity components at ~36 and ~58 km/s, spread over opposite parts of the complex. Two explanations were suggested for this peculiar kinematic structure: 1) a single region, located at a near-kinematic distance of 4 kpc, that is expanding with large internal motions or 2) a line of sight superposition of two unrelated regions at different distances.

Water masers at 22 GHz were detected in three molecular clouds in the complex. In the framework of the BeSSeL project, trigonometric parallax observations of these masers were conducted with the Very Long Baseline Array over the time span of one year.

I will report the parallaxes and proper motions of the water masers in this complex. The results prove that W33 is one expanding star forming complex, located at almost half the near-kinematic distance. This is the

most accurate distance to W33, and the first one based on an annual astrometric monitoring of the W33 water masers. I will discuss the three-dimensional motions of the three molecular clouds, obtained from the proper motions of the water masers and compare them with SMA observations of the outflows in these clouds.

Sadie JONES
University of Southampton, UK

Radio/X-ray variability and structure investigation of NGC 4051

The talk is an investigation into the emission from an individual Narrow Line Seyfert 1 (NLS1) Active Galactic Nuclei (AGN) NGC 4051. NLS1s have all the properties of Seyfert galaxies but show peculiar characteristics, including the narrowest Balmer lines, strongest Fe II emission and extreme properties in the X-rays. NGC 4051, is one of the most X-ray bright Seyferts and it has been studied extensively by a number of X-ray observatories. Recent studies have also revealed that Seyfert cores are variable at radio wavelengths, however, there are very few Seyfert radio variability investigations, and this is one of the first that also investigates the radio/X-ray (jet/disc) coupling. It has been known for some time that both the X-ray and continuum radio observations provide an optimal tool to access the innermost regions of the AGN. A combination of X-ray, radio and optical data is used to give an indept analysis of both the core and extended emission regions of NLS1 NGC 4051.

This work reveals that there is no clear evidence for radio variability in the core emission of NGC 4051 at 8.4 GHz with the possible exception of very low amplitude ~0.12 mJy variations detected in VLA A configuration. Deep VLA observations reveal a mean spectral index value of $\alpha \sim -0.3$ for the core, suggesting a self-absorbed jet. The surrounding radio emission has steeper spectral index values in the range of $-0.5 < \alpha < -1.6$ which suggests the extended radio emission is optically thin synchrotron emission. During the A configuration observations both VLA radio data sets (2000-2001 and 2008-2009) reveal a very weak positive correlation between the radio and much larger amplitude X-ray variations but there is no evidence for a β value much greater than ~ 0.1 for the $\mathrm{L}_R \propto L_X^{\beta}$ relationship, which is consistent with a constant radio luminosity for the core. Collimated VLBI structure is detected which hints at the presence of an unseen jet. The proposed jet is of non-negligible power and estimates of the buoyancy speed of the lobes, and the break timescales from the radio spectral index provide evidence for radio activity in NGC~4051 occurring on timescales greater than $>10^6$ years. Also, a change in the relative distance of the SW hotspot with respect to the core (seen in VLBI images) gives an apparent jet velocity 0.012 pc yr^{-1}, equivalent to a speed of 11,700 kms^{-1} (~ 0.04 c). Deep VLA radio imaging of NGC 4051 shows double lobed radio emission, which lies along the same PA as optical [OIII] emission. The nucleus of the [OIII] emission is coincident with the core radio emission. This structure suggests the presence of a double sided ionization cone, where both radio and optical emission are collimated by the same disc or tori.

Andrey KAZANTSEV
Pushchino Radio Astronomy Observatory ASC Lebedev, Russia

Monitoring and Search for Giant Pulses with LPA radio telescope at 111 MHz frequency

We carried out the program of observation of very rare phenomena – Giant Pulses (GPs) of pulsars in 2011-2012. We observed regularly more then 25 pulsars: 7 of them are known as pulsars with GP, when others were observed to search for GPs. We confirmed a generation of GPs from 3 of 7 pulsars with GPs at 111 MHz frequency. The most stable generations of GP was demonstrated by PSR B1112+50, several of it's GPs have peak intensities 45 times more then the peak intensity of the average profile (AP). Not so regular generation of GPs from PSR B0031-07 and J1752+2359 were found, and we didn't detect GPs for the rest 4 pulsars. We discovered strong individual pulses that may be considered as GP from 2 of pulsars. The peak intensity of individual pulses from PSR B1237+25 exceeds the peak intensity of the average profile (AP) by a factor of 30, and the most powerful individual pulse from this pulsar has the peak intensity 67 times more than that of average profile.

Konstantinos KOLOKYTHAS
University of Birmingham, School of Physics and Astronomy, UK

Radio properties of nearby galaxy groups

AGN (Active Galactic Nuclei) feedback is the most likely source of energy injection into the IGM of galaxy groups. Using a complete, optically selected sample of groups (the CLoGS project), observed in both radio and X-ray bands, I examine the radio properties of AGN in groups and their interactions with their environment. By focusing on low-frequency (GMRT) and high-frequency (VLA) radio properties, past as well as current activity can be identified by the use of radio spectral index maps. Combination of optical, X-ray and radio selection allows the study of the complex interactions between the physical processes that govern galaxy transformations such as AGN activity and star formation.

Sergey KORNEENKO
Institute of Applied Physics, Russia

Research of characteristics of 100-m radio telescope at the Max Planck Institute for Radio Astronomy

We report results of detailed study of the 100-meter radio telescope (surface efficiency, beam shape, noise temperature, pointing errors) obtained from the spectroscopic observations at 18 - 45 GHz from October 2001 till March 2011. The beam shape was studied by mapping of strong masers in molecular lines of CH_3OH (19.967 GHz), H_2O (22.235 GHz) and SiO (43.122 GHz). It is found, that sidelobe level is ≤ 3 % at elevations of maximum telescope efficiency. The main beam is a bit broader in elevation (about 5%) what is more noticeable at small elevation.

The HPBW as a function of frequency and elevation was obtained by approximation of large number the measurements in continuum in the E and H planes.

The zenith optical depth of the atmosphere in the studied frequency range was derived from sky scans as 0.03 – 0.2.

Evgeniya KRAVCHENKO
Pushchino Radio Astronomy Observatory ASC LPI RAS, Russia

Multi-frequency VLBA monitoring of gamma-ray bright blazar 1030+611 during its active state

The Large Area Telescope onboard the gamma-ray observatory *Fermi* registered in 2010 a bright gamma-ray flare in the radio loud blazar 1030+611. This event has triggered our campaign to monitor this blazar simultaneously at 5, 8, 15, 24, and 43 GHz with VLBA. Our observations have shown that a strong radio flare has started in the sub-parsec-scale core at about the same time as the gamma-ray flare. The observations were made about once per month during four epochs. This has provided an opportunity to study the blazar during its flaring state.

We have measured kinematics of VLBI jet components, an apparent speed was found to be (6.9 +- 0.7)*c*. Taken together with the frequency depending core-shift results, it provides an estimate of physical properties of relativistic plasma in the jet at parsec scales. We‘ve reconstructed polarization and Faraday rotation measure maps. With this data we estimated physical conditions inside the jet: derived values of the particle density and magnetic field, as well as its structure and other peculiarities.

Ivan LITOVCHENKO

Astro Space Center of LPI RAS, Russia

Interferometric observations of the source W3(OH) in the main lines of OH in preparation and holding the early science program of the space mission RadioAstron

We present results of the VLBI experiment at the wavelength of 18 cm, which simulate the ground-space interferometer with space arm RadioAstron. An array of five antennas was used, four of them are located in the Russian Federation, the last one - the 32-m radio telescope in Medicine (Italy). The 22-m radio telescope in Pushchino (Moscow Region) acted in place of the space arm. It has an effective area of 100 square meters. Three other Russian 32-m antennas are operating by the Institute of Applied Astronomy RAS. These telescopes are located at Badary, Svetloe and Zelenchukskaya (interferometer network "Quasar"). The maximum base length Badary-Svetloe was about 4402 km, it provides an angular resolution of about 0.009 arc seconds at the wavelength of 18 cm. Duration of the experiment was 10 hours at 02/03 February 2011.

The program of observations included quasars 3C273, 3C279, 3C286 and maser sources - W3(OH), W75N. The masers were investigated at frequencies of the main OH lines (1665 and 1667 MHz). The data were recorded on the MK5 recorder (32-m radio telescopes) and the RDR system (RadioAstron Digital Recorder) in Pushchino. Low SEFD (system equivalence of flux density) of Pushchino emulated space arm of the RadioAstron.

Also the first results of observations of the source W3(OH) are presented together with the network "Quasar" and the space radio telescope RadioAstron. Observations were carried out January 31, 2012. Base projections of the Earth-Space interferometer were about 4 Earth's diameter.

Correlation was performed with the universal software correlator of the AstroSpace Center of Lebedev Physical Institute. The correlator output format is compatible with the one used by the AIPS package, which was used for data analysis.

After analyzing the correlated data we obtained relative coordinates of the maser components. The main results are tabulated and presented on the figures. The data quality is sufficient for astrophysical analysis and comparison with previous observations of maser sources W3(OH) on VLBI networks EVN and VLBA.

Dmitry LADEYSHCHIKOV
Ural Federal University, Russia

New double-channel radiometer for RT-22 radio telescope

We present new double-channel radiometer for RT-22 radio telescope. It allow to observe two spectral lines simulteniously in frequency range 34-38 GHz. The ability to observe two spectral lines increase the efficiency of observation twofold. Together with new frequency synthesizers, the radiometer include network-based method for heterodyne oscillator control. With these improvements the overall stability of the radiometer is the matter of enhancement, as well as facilitaiton for observer and telescope operator with new user-friendly software for obsrvation and data proceeding.

In order to test the new radiometer and software we conduct proof quality observation of bright sources, seen in frequency range 34-38 GHz. The test observation program include bright sources in recombination lines of hydrogen (H56alpha, H57alpha) and Methanol lines (36.2 and 37.8 GHz). We detect emission lines in all sources, where emission is supposed to be strong. The observed parameters (velocity, line width and peak temperature) of lines are in agreement with results, obtained from other telescopes (Onsala 20m, Effelsberg 100m and NRAO 43m).

Marcelo L. LEAL-FERREIRA
Argelander-Institut fьr Astronomie, Germany

Shaping Planetary Nebulae: Evidences of Magnetic Fields Around Evolved Stars

Planetary Nebulae (PNe) have a large varied of morphologies. About 75% of the galactic PNe are not round. How these objects evolve from a spherical AGB star to a non-spherical PN remains unknown. Several candidates are suggested to play a role in this shaping process. One of these candidates is the magnetic field. Observations of magnetic fields around low/intermediate mass evolved stars are, however, still rare.

In this work we show the results of 22.23 GHz water maser emission around 5 evolved stars. The data were observed on the VLBA in full polarization mode, allowing us to infer the properties of the magnetic field in the water maser region of these objects. We report the detection of polarization (linear, circular or both) in 4 of the sources: OH231.8+4.2, RTVir, IRC60370 and IKTau. The strength of the magnetic field we measured vary from a few dozens to a few hundreds of mG. No maser features were detected in APLyn.

Lucas LINDROOS
Onsala Space Observatory, Sweden

Stacking of Interferometric data, a look at radio emission from distant galaxies

In the study of the high redshift universe large samples of galaxies are becoming increasingly important. By looking at large and deep samples we are able to draw conclusions on the large scale trends in galaxy evolution. Current radio/mm/submm high redshift surveys, however, primarily probe starbursts and AGN. A way to probe the radio and mm emission from less luminous galaxies is stacking. Stacking is a statistical approach to measure the average flux for known objects that typically are not detected individually.

As a part of my PhD project / research, I am developing a new algorithm for stacking of interferometric data. The main feature of the algorithm is stacking in the uv-plane.

In this talk, I will present the methodology along with a comparison between stacking in the uv-plane and in the image-plane.

The algorithms have been applied on deep VLA 1.4 GHz data from the Extended-Deep-Field South (ECDFS). This allowed us to statistically detect several groups of high redshift galaxies not previously detected in the field. The results for the SFR are consistent with the results obtained at other wavelengths.

Guillermo MANJARREZ
European Southern Observatory, Spain

CCS observations in L1448

I present VLA 1.3 cm observations of molecular transitions of CCS line and H20 maser emission towards the low mass star forming region L1448. We found that the CCS emission is clumpy and it is located around the central source of the outflow L1448C, showing an spatial anti-correlation with the NH3 data previously reported.

Evgeny MIKHAILOV
Research Computing Center of Moscow State University, Russia

Star formation and models of magnetic fields in spiral galaxies

Star formation is very important for growth of galaxy magnetic fields. The influence of star formation can be observed on LOFAR and SKA. But now there's no theoretical description of these effects. Star formation rate doesn't take part in equations of magnetohydrodynamics. The equations include only velocities of interstellar gas, its density and half-thickness of ionized gas disk. In this work a parametrization of these parameters is made.

There're some models of magnetic fields in spiral galaxies. One of the most interesting models was developed by D.Moss. It neglects details of magnetic field structure in the direction perpendicular to galaxy disc. It is called no-z model, and we use it for our problem. We conclude that influence of star formation is threshold. If the star formation rate reaches some critical value (it is more than in Milky Way by a factor of ten), the field falls and it can be restored only if the star formation stops.

In works of A.Shukurov it is said, that we should take in account magnetic helicity fluxes. But in these works there're ordinary differential equations. It is interesting to construct a model with partial differential equations. Such model is more accurate and takes in account that some important parameters are different in the center of galaxy and in its periphery parts, so we use it. Irrelatively of star formation processes, there're some important effects, that can be obtained only in this model. Touching star formation, we have made our results, obtained in classical no-z model, more exact.

Kunal MOOLEY
California Institute of Technology, USA

A Sensitive Search for Variables and Transients in the Extended Chandra Deep Field South

With the aim of characterizing the variable radio sky and deriving the rate of radio transients, we analyzed 49 epochs of the Extended Chandra Deep Field South (E-CDFS) observations at 1.4 GHz taken from the Very Large Array (VLA). This data is ideal for studying radio variability and transients on timescales ranging from one day to 3 months. With a single-epoch rms of about 30uJy, this study is only the second of its kind at sub-mJy flux densities. Below 1 mJy, radio source populations are increasingly dominated by star forming galaxies, and yet in this regime our knowledge about the variable and transient GHz sky is especially lacking. Our results suggest that only a small fraction of these sources are significantly variable. We do not find any transients, from which we derive an upper limit to the transient rate. This study, along with others planned for the near future, would serve as a pathfinder for upcoming wide-field surveys like ASKAP and Apertif.

Timur MUFAKHAROV
Special Astrophysical Observatory RAS, Russia

Simultaneous spectra and radio properties of the BL Lacertae objects

We present the data of 6 years (2006-2011) BL Lacertae (BLacs) monitoring program with the RATAN-600 radio telescope. The sample consists of 108 BLacs. A six-frequency broadband radio spectrum was obtained simultaneously with an accuracy of up to a minute. The observations were carried out at the frequencies: 1.1, 2.3, 4.8, 7.7, 11.2, and 21.7 GHz in the transit mode.

BL Lacertae type objects are a rare subclass of blazars which are subset (~1%) of the active galactic nuclei (AGN), characterized by nearly featureless optical spectra - almost without emission and absorption lines, extremely intense, broad and rapidly varying electromagnetic emission from radio to gamma-rays. Due to the unified scheme angle between jet axes and observing direction is very humble, it has to be approximately ?<20 . Only a relative small number BL Lacs objects have been observed intensively at many frequencies simultaneously. The spectral coverage of many of them is poor, both in the time and in the frequency.

In the BL Lacertae objects source list we have included approximately the same number of sources from all BL Lac subclasses: HBLs, IBLs, and LBLs (differing with the peak of their synchrotron emission in their spectral energy distribution: high-energy peak, low-energy peak, and intermediate). We present the flux density values for the sources, simultaneous radio spectra, spectral indices, redshift distribution and some variability parameters.

Elena NIKITINA
Pushchino Radio Astronomy Observatory ASC LPI RAS, Russia

Distribution of areas of radiation generation at different frequencies in pulsar magnetospheres

In our work we analyze samples of pulsars, which were measured at 10 cm and 20 cm, and homogeneous data obtained at these wavelengths.

It is shown that using the pulse width W_{10} and the maximal derivative of the position angle it is possible to calculate rather precisely the ratio n of the radius of the emission cone to the minimal distance of the line of sight from the center of the cone. The calculated values of n are in a good agreement with visual estimates on the base of the profile forms at the frequency of order of 1 GHz.

The values of n have been calculated for pulsars at wavelengths 10 and 20 cm as well. For the polar cap model ratios of n's characterize relative distances to levels of emission generation at these wavelengths.

Aleksandar SHULEVSKI
Kapteyn Astronomical Institute, the Netherlands

Tracing the Life - Cycles of AGN using LOFAR

Does every radio - quiet AGN hosted by an Early Type Galaxy goes through a radio - loud phase? What IS the duty cycle of an AGN; what are the ON and OFF timescales? Using the LOFAR telescope I am trying to detect (extended emission) radio relics. The time that has elapsed from the end of the previous AGN activity cycle can be inferred from an observed break in their synchrotron emission spectrum. I also use LOFAR to study young compact radio sources (CSS) to detect a low frequency turnover in their spectra and thus obtain a handle on their sizes. An example of this is the radio source B2 0258+35 which was a target observed with the WSRT and LOFAR telescopes.

Peter SIMS
University of Cambridge, UK

Foregrounds to the Epoch of Reionization

Study of the Epoch of Reionization (EoR) and the first luminous sources is a field at the forefront of observational cosmology. Over the coming decade the first experiments to study this missing chapter in the early history of the universe will come online and begin making observations using redshifted 21 cm hyperfine line emission from the neutral hydrogen that pervaded the IGM during this epoch. Detection of this emission on top of foregrounds five orders of magnitude greater in intensity will be a significant challenge requiring precise instrumental calibration, and accurate characterisation and subtraction of the foreground sources. This talk will describe aspects of the ongoing effort to model multiple components of the EoR foreground and the related task of uncovering the origins of the significant excess emission found by the ARCADE2 experiment beyond what they could account for through the CMB, Galactic emission and emission from catalogued extragalactic sources.

Daria TEPLYKH
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Radio Emission from Geminga

In this report we present new evidence for the detection of Geminga at three low frequencies. The observations were carried out on two sensitive transit radio telescopes in the range 42-112 MHz. We used three new digital receivers to detect the pulses and to obtain dynamic spectra. The examples of mean pulse profiles and individual pulses are presented. Exact value of the dispersion measure have been calculated using the simultaneous observations at three frequencies.

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Anomalous Emission - Zooming In on Spinning Dust

Anomalous microwave emission is a form of radio emission that peaks at tens of GHz. This emission, primarily observed in Galactic sources, most likely comes from spinning dust grains with an electric dipole moment. This explanation is based on the remarkable spatial correlation between large-scale 15-GHz emission and long-wavelength infrared emission, first discovered in 1997 at the Owens Valley Radio Observatory. Anomalous emission presents a new window on the physical conditions in the interstellar medium and is also a foreground for studies of the cosmic background radiation. This emission mechanism has so far been studied mostly on large spatial scales - tens of arcminutes to degrees. I am observing known anomalous emission regions with arcminute resolution in order to understand the small-scale environmental conditions that produce this poorly-understood form of emission. I use observations at multiple frequencies to distinguish between emission mechanisms. In addition, I compare the radio data to infrared data in order to understand the dust properties that lead to anomalous emission.

Samantha WALKER-SMITH
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Structure and Kinematics of NGC 2068

We have carried out a survey on the NGC 2068 region in the Orion B molecular cloud using HARP on the JCMT, in 13CO and C18O (J = 3 – 2) and H13CO+ (J = 4 – 3). We used 13CO to map the outflows in the region, and matched them with previously defined SCUBA cores. We decomposed the C18O and H13CO+ into gaussian clumps, finding 29 and 18 clumps respectively. The average deconvolved radii of these clumps is 5400 ± 2100AU and 2800 ± 900AU for C18O and H13CO+ respectively. We have also calculated virial and gas masses for these clumps, and hence determined how bound they are. We find that the C18O clumps are more bound than the H13CO+ clumps (average gas-virial ratio of 2.6 compared to 1.1). We calculate clump internal velocity dispersions of 0.28 ± 0.02 kms−1 and 0.24 ± 0.03 kms−1 for C18O and H13CO+ respectively; and we suggest that the starless clumps we found correspond to local turbulence minima. We also calculate clump-to-clump velocity dispersions of 0.43 ± 0.17 km/s and 0.42 ± 0.11 km/s for C18O and H13CO+ respectively. We find that the values for our clumps match results from numerical simulations of decaying turbulence in a molecular cloud, and therefore suggest that the NGC 2068 region forms stars on long rather than dynamical timescales.

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The faint source population at 15.7 GHz

I have studied a sample of 296 faint (~1 mJy) radio sources selected from an area of the Tenth Cambridge (10C) survey at 15.7 GHz in the Lockman Hole. By matching this catalogue to several lower frequency surveys (e.g. including a deep GMRT survey at 610 MHz, a WSRT survey at 1.4 GHz, NVSS, FIRST and WENSS). I have investigated the radio spectral properties of the sources in this sample; all but 30 of the 10C sources are matched to one or more of these surveys. There is a significant increase in the proportion of flat spectrum sources at flux densities below ~1 mJy - the median spectral index between 15.7 GHz and 610 MHz changes from 0.76 for flux densities greater than 1.5 mJy to 0.24 for flux densities less than 0.8 mJy. This suggests that a population of faint, flat spectrum sources are emerging at flux densities below 1 mJy. The spectral index distribution of this sample of sources selected at 15.7 GHz is compared to those of two samples selected at 1.4 GHz from FIRST and NVSS. There is a significant flat spectrum population present in the 10C sample which is significantly under-represented in the samples selected at 1.4 GHz. The 10C sample is compared to a sample of sources selected from the SKADS Simulated Sky by Wilman et al. and we find that this simulation fails to reproduce the observed spectral index distribution and significantly under predicts the proportion of sources in the faintest flux density bin. This highlights the importance of studying this faint, high frequency population.

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A search for radio nebulae around pulsars PSR J0358+5413, PSR J1809-1917 and PSR B1800-21

Radio interferometric data on pulsars PSR J0358 +5413, PSR J1809-1917, and PSR B1800-21 obtained with VLA are reduced with CASA and AIPS tools. An analysis of the results and their comparison with observations in other bands is given. Additional multi-channel observations of the objects with eVLA are necessary to conclude on their nature.