Abstracts of the oral presentations

44th Young European Radio Astronomers Conference

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1	**Krzysztof KATARZYŃSKI**	Our Radio Astronomy Observatory
A short description of the Department of Radio Astronomy and our research projects.		
2	**Filippo MACCAGNI**	What triggers a radio AGN? The role of the neutral hydrogen in young radio sources.
Neutral hydrogen observations provide great insights in the study of Active Galactic Nuclei. Neutral hydrogen has been detected in the very inner regions of several radio galaxies, suggesting it could interact with the radio activity. Especially in young radio galaxies, the HI, inflowing or outflowing, can regulate the fueling of the AGN. The case of the young radio source PKS 1718-649 is of particular interest. In this talk, I present ATCA high-resolution observations of this galaxy and the modeling of its large-scale HI disk. I show how the kinematics of this disk excludes a major accretion event as the trigger of the nuclear activity. I also analyze the nature of the absorption lines. We may trace small clouds close to the nucleus, not following the regular rotation of the disk. This suggests that the AGN has been triggered by a small-scale phenomenon in the inner regions of the galaxy. There is only a handful of objects where the HI has been studied in connection to the local triggering of the AGN. Therefore, we developed a shallow HI absorption survey of a flux-selected sample of 200 radio AGN of fluxes > 30 mJy. I will also describe the characterization of the heterogeneous sample of absorption lines we detected, focusing on the properties which may link the HI to the nature of the radio source.		
3	**Emilia JÄRVELÄ**	Statistical multifrequency study of Narrow-Line Seyfert 1 galaxies
High-energy γ-rays, produced by powerful relativistic jets, are usually associated with blazars and radio galaxies. In the current active galactic nuclei (AGN) paradigm, such jets are almost exclusively launched from massive elliptical galaxies. Recently, however, Fermi/LAT detected γ-rays from a few Narrow-Line Seyfert 1 galaxies (NLS1) and thus confirmed the presence of relativistic jets in them. NLS1 galaxies are assumed to be young evolving AGN characterized by narrow forbidden and permitted emission lines. According to studies they have low-mass black holes accreting at high rates and are hosted mostly by spiral galaxies. Thus they offer a unique opportunity to study the production of relativistic jets in late-type galaxies. In this study our aim is to estimate via which processes, and, if possible, where the emission of various kinds is produced in NLS1 galaxies, and to study how emission properties are connected to other intrinsic AGN properties. We have compiled the so far largest multiwavelength database of NLS1 sources. This allowed us to explore correlations between different wavebands and source properties using, for example, Pearson and Spearman correlations and principal component analysis. We did this separately for radio-loud and radio-quiet sources. In this talk I will give a brief overview of NLS1 galaxies, explain what we did in our study and present the main results. I will also tell about the ongoing project which aims to observe a large sample of NLS1 sources at radio frequencies.		
4	**Emma KUN**	Spinning supermassive black hole binaries at the base of extragalactic jets
Very Long Baseline Interferometry monitoring of extragalactic jets shows the existence of periodic brightness distribution of several jets. Numerous models explaining the observed bending and apparent precession of the radio jets need the inclusion of one or more supermassive black holes to the model directly affecting the jet launching process (e. g. Bardeen-Petterson interaction with an accretion disk, binary motion, spin precession). The talk will focus to the unresolved binary scenario, in which the jet-launching region is composed by two Kerr black holes. The talk will cover a case study: a spinning supermassive black hole binary revealed by VLBI data on the jet of S5 1928+738. Black hole spin measurements in AGN will have also large influence.		
5	**Maciej CEGŁOWSKI**	BALQSO phenomenon as a hybrid scenario of orientation and evolutionary schemes
The extremely fast outflows of highly ionized plasma which are lunched in proximity of Supermassive Black Hole are responsible for blue-shifted Broad Absorption Lines - BALs in QSO spectrum. There are two scenario which attempt to explain their existence. According to the first one outflows manifest as BAL in spectrum only if seen under specific inclination - “Orientation scenario”. Latter one suggest that BALQSO are connected with particular stage in quasar evolution - “Evolutionary scenario”. The radio emission is additional tool to understand the orientation and age of BALQSOs by the VLBI imaging, the radio-loudness parameter distribution and ariability study. Our high resolution VLBA and EVN observations of a sample of compact BAL quasars revealed they posses one-sided, core-jet structures typical for quasars, but their radio jets are not prominent. Nevertheless they belong to the high luminosity tail of the radio power distribution of BAL quasars. However, most of the BAL quasars are intermediate or low radio objects with radio luminosities in the FR I – FR II transition region similar to low power compact steep spectrum (CSS) and gigahertz peaked spectrum (GPS) sources. There is a hint in our analysis that the strongest absorption is associated with the lower jet powers in BAL quasars. The radio-to-optical (i-band) ratio of quasar core – radio-loudness parameter logR - analysis shows that most of the BALQSOs have logR< 1.5. The radio-loudness parameter is thought to be a good indicator of the orientation and their low values indicate large viewing angles. What is more these lower values of logR are associated with the strongest absorption. However, the large span of the absorption values in the whole group of BALQSOs indicates that orientation is only one of the factors that influence the value of measured absorption. Rather than separately, BALQSO phenomenon can be explained as hybrid scenario of orientation and evolutionary schemes.		

6	**Alessandro MAINI**	AGN component in Deep Radio Fields
My PhD project is focused on the study of the AGN component found in deep radio fields. The AGN properties will be explored through a multi-wavelength analysis, including optical spectroscopy, SED fitting and high-resolution VLBI observations. In this talk I will present the first results from the ATLAS deep field.		
7	**Timur MUFAKHAROV**	Investigation of the BL Lac objects with the RATAN-600 radio telescope. Introducing the RATAN-600 multi-frequency catalogue.
BL Lac objects emit strongly variable and polarized non-termal radiation across the entire electromagnetic spectrum, from radio to γ rays, and represent about 1% of known AGNs. They belong to the blazar population and differ from other blazars with that they have a featureless optical spectrum, sometimes with absorption lines, or with weak and narrow emission lines. One of the most effective ways of studying the physics of BL Lacs is the use of simultaneous multi-frequency data. We present the data of 9 years (2006-2014) BL Lacertae (BL Lac) monitoring program with the RATAN-600 radio telescope. 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. We present a new catalogue of the RATAN-600 multi-frequency measurements for the BL Lacs objects. The catalogue is available at http://www.sao.ru/blcat/. The present version of the catalogue consists more than 300 BL Lacs objects and candidates based on their optical and radio properties. The catalogue is presented in interactive form and currently contains RATAN-600 flux densities measurements over nine years (2006–2014), radio spectra at different epochs and their parameters. We discuss the general properties of the sample, and individual objects.		
8	**Brenda NAMUMBA**	Evolution of cold gas in active galaxies
Cold gas in galaxies has been related to the formation and evolution of galaxies in the recent past as it is a processor of star formation. However, still very little is known about the evolution of cold gas present in galaxies. One of the main goals of this project is to use HI absorption line to study the evolution of cold gas in three active galaxies using the KAT-7 data. This will enable us study the statistical properties of the atomic hydrogen across wide redshift and provide important input on the environment where the cold atomic gas is detected via 21 cm absorption line.		
9	**Sara CUADRADO**	Millimeter molecular line survey of the Orion Bar PDR: Small hydrocarbon molecules.
In the context of investigating the chemistry prevailing in hot molecular gas irradiated by strong FUV radiation fields, we have performed a complete millimeter line survey toward the Orion Bar photodissociation region (PDR) using the IRAM-30m telescope. The Orion Bar is the interface between the Orion Molecular Cloud and the HII region illuminated by the Trapezium stars. Owing to its proximity (approximately 414 pc) and nearly edge-on orientation, the Orion Bar offers the opportunity to determine the chemical content and formation-destruction routes in UV-illuminated gas. Our observations show the chemical richness of the harsh Orion Bar environment. We have identified hundreds of molecular lines (small hydrocarbons, molecular ions and radicals, isotopologues, complex organic molecules...) and tens of hydrogen, helium and carbon recombination lines. The line survey was complemented with maps of the line emission spatial distribution of different species. Approximately 40% of the detected lines arise from small hydrocarbon molecules. Carbon chemistry plays a pivotal role in the ISM but even the synthesis of the simplest hydrocarbons and how they are related to PAHs and grains are not well understood. The high number of detected lines and the emission maps of some hydrocarbons allows us to carry out a detailed analysis of their chemistry, spatial distribution and formation mechanisIn this contribution I present a summary of the complete molecular line survey, as well as our detailed study of the chemistry and spatial distribution of small hydrocarbons.		
10	**Hoai DO THI**	The multi-scale environment of RS Cnc from CO and HI observations
We present a detailed study of the circumstellar gas distribution and kinematics of the semi-regular variable star RS Cnc on spatial scales ranging from $\sim 1''$ ($\sim$150 AU) to $\sim 6'$ ($\sim$0.25 pc). The close environment of RS Cnc (from 1 to 20 $''$) can be described with a model in which the density and the velocity vary smoothly from the equatorial plane to the polar axis. In this model the mass loss rate is higher along the polar directions than in the equatorial plane, which seems to exclude both stellar rotation and magnetic field as a cause of the axi-symmetry. Outside this region, whose study is limited by the photo-dissociation of CO, HI data at 21 cm show that the flow is slowed down at a typical distance of 1$'$ ($\sim$ 0.04 pc). Further away the flow is distorted by the relative motion of the star with respect to the interstellar medium (1 to 6 $'$, or 0.05 to 0.25 pc).		
11	**Antonio DÍAZ-PULIDO**	Observations of 'thermal' SiO emission at lambda=7mm (v=0, J=1-0) from AGB stars
Since the installation of the new receiver capable to measure at 45GHz (Q-band) at the 40 meters Yebes radiotelescope, multiple AGB stars (of the Asymptotic Giant Branch) has been observed. With high frequency resolution samplings we have been able to find that profiles of many of the different studied sources were unexpected and not before described.		

12	**Enrique GARCIA**	Thermal CO, 13CO and H2O emission in “Water Fountain” stars from Herschel/HIFI observations

Authors: E. Garcia-Garcia (1), J. R. Rizzo (1), J. F. Gómez (2) (1) Centro de Astrobiología (INTA-CSIC); (2) Instituto de Astrofísica de Andalucía (CSIC) 'Water Fountain' (WF) are post-AGB stars that present 22 GHz H2O maser emission through fast and collimated bipolar jets. When observed at high angular resolution, these structures display water spots moving at relative velocities above 100 km/s. These outflows are the reason why WFs stars are believed to play a key role in the shaping of multipolar planetary nebula. Besides the jets, WFs are expected to host a thick circumstellar disk and a large surrounding AGB envelope developed in their previous stage. We present the results of a study of thermal emission from 8 WFs sources using the HIFI instrument on board the Herschel Space Observatory. The observed lines are mainly mid- and high-J CO and 13CO, and low rotational water transitions. We proceed to analyze the detections by LTE and LVG models. When possible, thermal emission associated with the outflow and some parameters of the AGB envelopes are derived. Also, isotope ratios from our sample are compared with other post-AGB stars.

13	**Elisabeth KUENZL**	Molecular line spectroscopy and extinction mapping of dense cores in a nearby molecular cloud

In order to investigate the physical conditions in dense molecular cores, we have studied dense cores in the Pipe Nebula in various molecular transition lines. Additionally, we have obtained near-infrared extinction maps in matching angular resolution. With its low star formation efficiency of only 0.06%, the nearby Pipe Nebula (d 130 pc) is an ideal laboratory to study the initial conditions of star formation. Here we investigate the utility of different molecular transition lines to study core structure as a function of column density, as traced by extinction mapping. For these purposes, we have used the 22-m Mopra radio telescope to map three cores (including Barnard 59) in CO(1-0) and its isotopologs 13CO, C18O, and C17O, as well as in additional tracers with higher critical densities: HCN, H13CN, HNC, HCO+, H13CO+, and N2H+, all in their 1-0 transitions. We here present a detailed comparison of these transitions and the corresponding extinction maps. 12CO and 13CO were found to be optically thick in all cases whereas C18O remains optically thin up to highest extinction values of 80 mag. These lines were used to derive excitation temperatures and column densities for all three sample cores. A comparison of CO lines and high density tracers like N2H+ showed signs of ongoing depletion.

14	**Alicia LÓPEZ JIMÉNEZ**	DETECTION OF ORGANIC MOLECULES TOWARDS A MASSIVE STAR FORMING REGION

Radio astronomical line surveys with the IRAM 30-m telescope have allowed us to observe and identify abundant complex N- and O-bearing molecules including their vibrationally excited states (CH_3CH_2CN, CH_2CHCN, $HCOOCH_3$, CH_3COOH, CH_3OCH_3,...) towards Orion-KL Nebula, a source of massive star formation. To deal with the great number of rotational lines produced by these complex organic molecules we have performed spectroscopic and astrophysical analysis in order to refine the physical and chemical conditions of the observed region and to reduce the number of U-lines observed in our line survey. Using a 2D spectral line survey of Orion-KL 2D we have also obtained intensity maps for the emission of the strongest rotational transitions which permit to derive the spatial distribution of the abundance of these molecular species.

15	**Luis Henry QUIROGA-NUNEZ**	EVN observations of maser polarization in the massive star-forming region IRAS22272+6358A

The project was developed at Joint Institute for VLBI on Europe (JIVE), where we reduced and analyzed data from 6.7 GHz methanol maser observations, which were made on October 2011 by using seven antennas of the European VLBI Network (EVN). The observations were pointed towards the massive (14.2 solar masses) protostar IRAS22272+6358A, which is located in the dark cloud L1205 that is in the Local Spur Arm at a distance of about 0.8 kpc. The data reduction was done by using AIPS. We measured the linearly and circularly polarized emissions of the methanol masers located around IRAS22272+6358A . The aim of the project was to calculate the orientation and strength of the magnetic field around the massive protostar. We detected twenty-three methanol masers, which are aligned with the outflow, with a peak flux density between 0.1 and 4.8 Jy/beam (rms=3mJy/beam). In three masers we were able to detect linearly polarized emission, with a linear polarization fraction between 0.7% and 1.2% with a weighted linear polarization angle of about 75 degrees. Unfortunately, we did not detect circular polarization in any maser feature (<4 sigma),consequently we were not able to estimate the strength of the magnetic field. Using a Full Radiative Transfer Method, we measured the Emerging Brightness Temperature and the Intrinsic Thermal Linewidth for each maser that showed linear polarization. Finally with these values, we were able to find that the magnetic field is perpendicular to the linear polarization vectors allowing us to determine the orientation of the magnetic field in three dimensions. IRAS22272+6358A is part of a larger project which is focused on measuring the magnetic field in several massive star-forming regions,with the objective of improving (based on observations) the future simulations.

16	**Aleksandra WOŁOWSKA**	Variability of the methanol maser 94.602-1.796

A sample of 142 6.7Ghz methanol masers was monitored using Toruń 32m antenna during the period 2009 June - 2013 April. Majority of those sources display a significant level of variability. We present a summary of the observations of one selected object: 94.602-1.796.

17	**Karina SKIRMANTE**	The first results of OH spectrum lines detection from the dwarf planet Ceres with Irbene RT32

The direct identification of water molecules escaping from on the surface of the dwarf planet Ceres were detected by Küppers using the European Space Agency's Herchel Space Observatory [1]. A few questions are still opened – this includes the origin of energy source for water sublimation on Ceres – clearly, an extra observation are beneficial. Observation session of OH maser emission lines in IEEE L-band with 32m radio telescope of Ventspils International Centre of Radio Astronomy is proposed due to recent availability of RT-32. At the moment the 1.6 GHz receiving system can be mounted on RT32, prolonged sessions for accumulation of signal are possible. The observations are planed in summer 2014. These are still challenging due to expected low signal strength and equipment specifics. 1. Küppers, et al, "Localized sources of water vapour on the dwarf planet Ceres", doi:10.1038/nature12918

18	**Volker WEISS**	The radio show of proto-stellar outflows

Proto-stellar outflows are a prominent feature of stellar birth. Despite many investigations of such flows, their impact on the parental molecular cloud is still highly disputed [1]. Simulations suggest that proto-stellar outflows are too weak to replenish turbulent energy globally [2], and thus have little influence on stabilizing the cloud. On the other hand, observations show that outflows can generate highly stirred local velocity fields [3]. As part of the DFG Priority Program "Interstellar Matteróur study aims at clarifying the role of proto-stellar outflows for their environment. To this end, we derive parameters of a statistically complete sample of outflows in a star-forming (SF) region. To reduce the influence of additional mechanisms which provide energy and momentum input, we chose a near-by, low-mass, outflow-dominated SF region, namely NGC 1333. Here we conduct a thorough exploration of all accessible outflows over a broad spectral interval, ranging from shock-excited H_2 in the near-IR to the millimeter radiation of entrained CO. By means of this "bolometric" approach more precise information on the flow properties can be gathered. Dynamical parameters as mass and velocity are derived from spectral and spatial CO line fluxes, respectively. Morphological properties like opening angle and inclination are derived from the CO line maps. Complementary information are obtained from multi-epoch H_2 imaging as well as IR-spectra of the driving jets. Here I will present the observations and preliminary results of CO-maps of NGC 1333 following the course of our study. [1-3] references: cf. talk

19	**Jakob GELSZINNIS**	Radio Halos and Radio Relics as Tracers of Merging Galaxy Clusters

Galaxy clusters are the largest gravitationally bound structures in the universe. Clusters grow mainly by mergers which lead to shock fronts and turbulence in the intercluster medium (ICM) of which many properties are still unknown. Diffuse, extended radio emission was found in some merging galaxy clusters. Those structures are classified as radio halos and radio relics. Radio halos fill most of the cluster and are well centered on the cluster's X-ray emission. Radio relics reside rather in the cluster periphery, tracing shock fronts which move outwards. The emission originates from highly relativistic particles within the ICM emmiting syncrotron radiation while moving through the cluster magnetic fields. As the existence of the highly relativistic particles is connected with the ICM dynamics and the magnetic field, diffuse emission in galaxy clusters can be used to better understand the ICM. The number of known radio relics and radio halos is still small. Less than one hundred of those objects have been identified up to now, most of them in massive galaxy clusters. Searching for diffuse emission in galaxy clusters is notoriously difficult since the diffuse emission often has low surface brightness while the cluster may host bright radio galaxies. The requirement of studiing clusters in high resolution and with good sensitivity for extended structures is addressed by apperture synthesis combining long and short baselines. Additionally, the steep spectrum of those sources motivates searches in the low frequency regime. I searched for radio relics and radio halos in less massive galaxy clusters identified through the 2XMMi/SDSS Galaxy Cluster Survey. Therefore I combined archived VLSS, NVSS, and FIRST images to identify the clusters with the most promising signatures of diffuse emission. Deeper observations done with the Giant Metrewave Radiotelescope (GMRT) were used to reveal the nature of those findings which I will present and discuss within my talk.

20	**Christopher RISELEY**	The Diffuse Radio Emission of Galaxy Cluster Abell 3667

Galaxy clusters form following the dark matter distribution left over from the early universe, growing through both low-energy events such as accretion of gas and high energy events like cluster mergers, which release tremendous amounts of energy into the intracluster medium (ICM). Indeed, major mergers are some of the most energetic events since the Big Bang. One tell-tale indicator of cluster merger events is the detection of diffuse low surface-brightness radio emission. Such emission is a sign of non-thermal components and large-scale magnetic fields in the ICM. In this talk I will discuss new results from work conducted with the Karoo Array Telescope (KAT-7) - a precursor to MeerKAT and the Square Kilometre Array (SKA) - based on observations of the well-studied Southern hemisphere galaxy cluster Abell 3667. The results show both known radio relics in A3667, as well as the brightest cluster galaxy (BCG) B2007-569. Ancillary higher-resolution data is used to subtract the BCG in order to investigate the nature of the recently-reported 'bridge' of diffuse synchrotron emission connecting the North-Western relic to the core of A3667, revealing a localised excess of emission which is tentatively identified as a radio mini-halo. This candidate mini-halo has properties consistent with trends in scaling relations in the wider population.

21	**Quentin SALOME**	3C 285: a nearby galaxy with jet-induced star formation

How efficiently star formation proceed in galaxies is still an open question. Recent studies suggest that AGN can regulate the gas accretion and thus slow down star formation (negative feedback). However, evidence of AGN positive feedback has also been observed in a few radio galaxies (eg. Centaurus A, Minkowski's Object, 3C 285, and the higher redshift 4C 41.17). Here we present CO observations of one of them (3C 285), which is an example of jet-induced star formation: a spot (named 09.6) aligned with the radio jet, at a projected distance of 70 kpc from the galaxy centre, shows star formation, detected in optical emission. To know the distribution of molecular gas along the jets is a way to study the physical processes at play in the AGN interaction with the intergalactic medium. We observed CO lines in the central galaxy with the IRAM-30m telescope. The spectra present a double-horn profile, typical of a rotation pattern, from which we will be able to estimate the density profile of the galaxy. Interestingly, the 09.6 spot is not detected in CO, that shows the lack of large amount of molecular gas in this region. The cold gas mass upper limit is consistent with a star formation induced by the compression of dense ambient material by the jet. The molecular gas surface density follows a Schmidt-Kennicutt law if the emitting region is very compact and follows the Ha emission. Higher spatial resolution observations are thus required in order to detect and map the CO in this jet-induced star forming region.

22	**OLUWASOGO OGUNGBENRO**	Rotation Measure Distribution in Compact Steep-Spectrum Sources

We have used radio polarization data at different frequencies to obtain the rotation measure, RM, the source rest frame rotation measure, RM(1+z)2 and the spectral index, in a sample of Compact Steep-spectrum Sources (CSSs). The CSS quasar sub-sample has |RM(1+z)2| median values of 195.86 rad m-2 and 351.11 rad m-2 for the jet and counter-jet sides respectively, while corresponding values for galaxies are 43 rad m-2 and 35.20 rad m-2. We found more negative rotation measure values on the jet side than on the counter-jet side in both CSS quasars and galaxies. Median spectral index values of 0.80 and 1.24 were obtained for the jet and counter-jet sides respectively of the sample. Spectral index difference between the components of each source has median values of 0.23 and 0.27 for the CSS galaxies and quasars respectively. The observed results shows that different mechanisms may be at play in shaping the CSS phenomena.

23	**Flor ALLAERT**	The relation between gas, dust and total mass in edge-on spiral galaxies

The gas-to-dust ratio is a key diagnostic in understanding the chemical evolution of galaxies. Unfortunately, a solid measurement of this ratio is generally hampered by the difficulty to accurately determine the distribution of the interstellar dust. In edge-on galaxies, however, the dust not only seen in emission, but also in absorption, making it possible to model their dust content using reliable radiative transfer models. We present the HEROES project, an analysis of 7 nearby edge-on spiral galaxies, based on a multi-wavelength data set including optical, NIR, FIR and radio data. We combine a detailed determination of the dust distribution with 3D kinematical models of the gas content to measure the radial variation of the gas-to-dust ratio, out to large galactocentric radii. We also test the reliability of using FIR emission as a tracer for the total ISM distribution in galaxies, and we explore the possibility of a universal dust-to-total mass ratio.

24	**Sho NAKAMURA**	A new HLL approximate Riemann solver for magnetohydrodynamics including Cosmic-Ray effects

We developed a new numerical magnetohydrodynamic (MHD) solver in which effects of the Cosmic-Ray(CR) pressure is taken into account when the speeds of the fast magneto-acoustic wave are calculated in the Harten-Lax-van Leer (HLL) Riemann solver. The sound speed in usual HLL Riemann solver is replaced by the effective sound speed which is combined fluid of gas and CRs. Diffusive propagation of the CR is also solved. To treat diffusion term of the CR as flux term, diffusion of the CR is solved by explicit method. In this presentation, we explain the fundamentals of our method and show results of test problem and application to the Fermi bubbles.

25	**Andrzej KUS**	History of the Radio Astronomy in Toruń

A historical review of the radio astronomical instruments and scientific projects developed in Toruń.

26	**Elena NIKITINA**	The structure of the magnetosphere of radio pulsars with interpulses

Pulsars with interpulses - pulse components located between main pulses - are investigated. About 50 such objects are known this moment. The previously developed methods of estimations of the angle BETA between the rotation axis and the magnetic moment of the neutron star have been used for the solution of a question on the magnetosphere geometry of these objects. For some pulsars BETA < 20° and we can expect not only interpulses but interpulse radiation and the correlation in the behaviour of interpulses and the main pulses for those pulsars as well. This angle is more than 60° for other pulsars, and the appearance of the interpulses is possible if the radiation cone is sufficiently broad and there is the favorable orientation of the line of sight of the observer. We confirm the suggestion made earlier about two types of pulsars with interpulses - aligned and orthogonal ones. Estimates of the pulsar ages for these two groups indicate that aligned rotators are several times older than orthogonal ones. This work was supported by the Russian Foundation for Basic Research (project 12-02-00661) and the Basic Research Program of the Presidium of the Russian Academy of Sciences Ńon-stationary Phenomena in Objects of the Universe".

27	**Natalia LEWANDOWSKA**	Radio Giant Pulses

Single pulse emission represents a widely studied field in the case of radio pulsars. The richness of single pulse phenomena has been examined extensively by various researches in the past years and includes marching subpulses, nulling, giant micropulses, spiky emission and also giant pulses. Giant radio pulses differ from regular pulses by their apparently non-periodical occurrence at certain phase ranges, much higher flux densities, high brightness temperatures up to 10^39 K and power-law intensity distributions. With the origin of the regular radio emission being still unknown, the emission process behind giant pulses is not understood either. Multifrequency studies are the key solution to unravel the characteristics at different frequency ranges. The talk presents results from a multifrequency observation campaign of giant radio pulses from the Crab pulsar and discusses the resulting constraints on different emission models.

28	**Anastasiia SKORYK**	Detection of a Fine Structure of the Pulsar J0953+0755 decametric radio emission

In this work anomalously intensive pulses (AIP) of the pulsar J0953+0755 were studied in order to find a fine structure of its radiation in the low frequency range 17 – 33 MHz. All observations were carried out using the radio telescope UTR-2. It was found, that dispersion measure (DM) fluctuates from pulse to pulse in the set of AIP that could be explained by fluctuations of electron concentration in the space near a neutron star. In the most intensive pulse a complicated four-component pattern was found, where the DM values of even and odd components are different and are equal to DM_{even} = 2.9731 $\pm$ 0.5e-4, DM_{odd} = 2.9720 $\pm$ 0.5e-4 pc/cm^3 respectively. The detected difference in DM is associated with fluctuations of electron concentration in the pulsar magnetosphere. The obtained characteristic time of the fine structure is approximately 1 The developed methods of AIP analysis give an opportunity to resolve a pulsar magnetosphere into depth.

29	**Karolina ROŻKO**	The effects of thermal absorption on the observed pulsar radio spectra

(In collaboration with J. Kijak and W. Lewandowski.) The recent discovery of gigahertz-peaked spectra (GPS) pulsars has forced us to revise our understanding of the observed pulsar spectra. The majority of these objects appear to be within some interesting environments such as dense HII regions or pulsar wind nebulae (PWN). This fact and the case of a binary pulsar B1259-63 (which spectra changes with orbital phase) led us to believe that the spectral turnovers are caused by external factors. One of the phenomena that can cause such effect is thermal absorption. This process is well known to work in the interstellar medium and it causes the spectra of radio sources to turnover at low frequencies. Recent observations of the PWNe give us detailed informations about this kind of pulsar environment. It seems that at least in some cases the physical parameters of the matter of the PWNe are such that the process of thermal absorption can affect the radio waves up to frequencies of about a few GHz. Our simulations show that the efficiency of this process depends on the geometry of the pulsar environment and the pulsar's line-of-sight.

30	**Khan Muhammad Bin ASAD**	Systematic effects in the polarimetric observations of radio interferometers

Radio telescopes, in theory, have a completely polarized response to an incoming signal, i.e. only one polarization state of the incident wave is detected by any one of the feeds of a radio antenna. By correlating the voltages measured by the feeds of the antennae of an interferometer we can calculate the total and polarized intensities of the radiating source. To be able to reconstruct the intensities perfectly, we should have an instrument where one feed is sensitive to solely one polarization state and have zero sensitivity to the other state which, in reality, is not the case; there is always some leakage from polarized intensity to total intensity and vice versa due to various systematic errors. The amount of polarization leakage needs to be known beforehand so that it can be removed during calibration and/or imaging. We have quantified the amount of leakage of the foregrounds in the LOFAR observations of 21-cm signal coming from the epoch of reionization (the EoR signal). It is especially important to know the leakage in this case because the EoR signal is expected to be present in the total intensity maps after removing the diffuse foregrounds based on their smooth frequency behavior, and as foregrounds are not smooth functions of frequency in polarized intensity a small amount of leakage might prevent complete removal of foregrounds and even cause some signals to be removed during the process. To quantify the leakage precisely we have simulated similar observations with different instrumental errors and primary beam errors to see how much polarization leakage they are causing. We have seen that although direction independent instrumental errors can cause leakage, their effects can be removed by standard self-calibration. However, direction dependent beam errors can cause an unpolarized source to appear almost 1%-5% polarized depending on its distance from the phase center and this effect cannot be removed sufficiently by direction independent calibration.

31	**Sayan BASU**	VLBI imaging of Deep South ICRF sources

The current realization of the International Celestial Reference Frame (ICRF) is based on the Very Long Baseline Interferometric (VLBI) measurements of positions of extragalactic radio sources observed at 2.3 GHz (S-Band) and 8.4 GHz (X-Band). The primary sources used as reference source in VLBI are radio-loud quasars. The ones most useful as reference sources are those where radio emission is compact or core-dominated at the observed frequency. However most extragalactic radio sources show extended structure on milliarcsecond scales. Source structure can evolve significantly over time scales of months to years. The effect of source structure on VLBI astrometric positions can be significant and it is therefore important to monitor reference sources for variability or structural changes so that their astrometric quality can be continuously evaluated. The current ICRF is weak in the south, especially at declinations below -45 degree, and regular imaging of ICRF sources have been done mostly in the Northern Hemisphere using the Very Long Baseline Array (VLBA). In recent years, there have been some efforts to increase the number of known reference sources in the south, in particular the astrometric observations from the Long Baseline Array (LBA) Calibrator Survey (LCS) and Celestial Reference Frame Deep South (CRDS) campaign. However, dedicated imaging observations to map the structures of these sources on a regular basis has proven to be very resource intensive and we have investigated the possibility of imaging source structure from existing astrometric observations. We present our first imaging results for southern sources observed through the LCS and CRDS astrometric sessions

32	**Michael TARR**	Detecting the signal of shear by weak lensing in the radio UV plane.

Wide-field radio observations such as those being generated by LOFAR and the ASKAP will provide the deepest and widest surveys of the universe so far. With rapidly advancing computing power and ever increasing understanding of the data, radio interferometers are posed to become the future of observational astronomy. One signal that we wish to detect from this data is from the shear due to weak lensing. The well established theoretical understanding of lensing and the vast number of these events in the universe means that galaxy shear could be a strong constraint on cosmology and also provide a detailed picture of matter density. In order to measure this signal by traditional methods we require high quality images in real space; for radio data this presents a problem. Radio observations produce data in the Fourier domain and since the imaging of this data is an approximation, and a computationally heavy task, there is inevitably an additional error present. Furthermore, the standard methods for creating a map of matter density uses an additional Fourier transform of real space shear measurements. It would clearly be preferable to make these measurements directly from the UV plane. In this talk I will present a method for measuring shear in the Fourier domain, and discuss the possible implications for the error on this measurement and the possible benefits to imaging.

33	**Luke JEW**	C-BASS: The C-Band All Sky Survey

The C-Band All Sky Survey (C-BASS) is making high signal-to-noise all-sky maps at a central frequency of 5 GHz with a bandwidth of 1 GHz in stokes I, Q and U. Maps at this frequency will be dominated by synchrotron radiation and largely uncorrupted by Faraday rotation which makes them an ideal synchrotron template for use in CMB foreground subtraction. Secondary science goals include mapping the local galactic magnetic field, further studying the distribution of anomalous microwave dust emission and furthering our understanding of (or belief in) the WMAP haze. When completed C-BASS will be the highest radio frequency all-sky map made from the ground. The northern survey will be completed in summer 2014 and the southern survey should be completed by the end of 2015. In this talk I will present an overview of both the telescope systems and current status of the analysis.

34	**Christoph RAUCH**	NIR triggered phase referencing of the Galactic Center radio source SgrA

The compact radio source Sagittarius A* (Sgr A*) is commonly assumed to be associated with the super-massive black hole (SMBH) of $\sim 4.0 \times 10^6$ M(sun) at a solar distance of $\sim$ 8.0 kpc in the center of the Milky Way. Because of being about one hundred times closer than the second nearest active galactic nucleus (M31) and having the largest projected Schwarzschild radius on the sky this SMBH is the most interesting target to study the physics of these objects. Sgr A* shows spontaneous flares at radio and millimeter wavelengths. These intensity outbursts appear on timescales ranging from 1-2 hours (main-flares) down to 7-10 minutes (sub-flares). The currently most accepted models trying to explain these flux variations are magnetic turbulence and adiabatic expansion. The best properties to investigate the nature of this effect are the position, the morphology and the full width at half max (FWHM) Gaussian size of the compact radio source Sgr A*. Relativistic Magnetohydrodynamics simulations predict a constant size and shape of its emission region. If adiabatic expansion would be causing the flares, a change of the morphology and/or FWHM would be observed. In case of an orbiting or asymmetrically located (with respect to the emission center) expanding feature, a position wander will be detectable. The closure phases would also be different from zero due the increased asymmetry of the source. A correlation between NIR/X-ray and mm-flares together with a change in source morphology or size would provide strong evidence for the adiabatic expansion model. We present a 7 mm VLBI observing campaign, triggered for the first time by an observed VLT NIR flare of Sgr A* which offers the possibility to discriminate between these models.

35	**Pfesesani Victoria VAN ZYL**	Radio & Gamma-ray correlation of the blazar PKS1424-418 during its flaring state.

We carried out a multi-frequency cross-correlation analysis of the blazar PKS 1424-418 with data collected by Fermi-LAT and the HartRAO 26m radio telescope between 2012 September 10th and 2013 September 8th during its flaring state. Using the dcf and the zdcf from Alexander (1997) we examined the data for time lags. Our results confirmed the existence of a significant cross-correlation between the gamma-ray and the radio data, with the radio events being delayed relative to the gamma-ray events.

36	**Frederic JARON**	Radio characteristics of LS I +61°303
LS I +61°303 is one of the few radio to TeV emitting X-ray binaries. I will discuss newly discovered radio characteristics of the system and their relationship to gamma-ray emission.		
37	**Grzegorz RYCYK**	Trigonometric parallax of AM Herculis
Multiepoch phase-referencing VLBI (Very Long Baseline Interferometry) observations with EVN (European VLBI Network) were performed for the catalismic variable star AM Herculis during one year from 2012 to 2013. By combining these results with two other observations from VLA we obtained parallax and proper motion of AM Herculis.		
38	**Anatoly GLYANTSEV**	Velocities of interplanetary coronal mass ejections from interplanetary scintillation observations
The interplanetary scintillation (IPS) data in the period from July 2011 to June 2012 were used for interplanetary coronal mass ejection (ICME) propagation study. The observations of scintillating sources ensemble have been carried out with the LPA radio telescope at the frequency 111 MHz. We consider scintillation index increase in more than 1.5 times in comparison with previous day for more than 5 sources as indicator of ICME passages. IPS data are compared with data on coronal X-ray radiation bursts and geomagnetic disturbances. It is shown that our observations allow to detect almost all ICME caused by coronal events of M5.0 class and stronger. The ICME velocities were estimated for events revealed as in X-ray bursts so in IPS increases and in geomagnetic disturbances. Our estimates of ICME velocities are compared with the mean disturbances velocities between the Sun and the Earth.		
39	**Victor M. RIVILLA**	Short- and long-term radio variability of young stars in the Orion nebula cluster and molecular cloud
We have used the Very Large Array to carry out multi-epoch radio continuum monitoring of the Orion Nebula Cluster and the background Orion Molecular Cloud. Our observations reveal the presence of 19 radio sources, mainly concentrated in the Trapezium Cluster and the Orion Hot Core regions. With the exception of the Becklin-Neugebauer object and the source C the sources all show variability on timescales of months. We find tentative evidence of variability in the emission from the massive protostar Source I. Our observations also confirm radio flux density variations of a factor >2 on timescales of hours to days in 5 sources. One of these flaring sources, OHC-E, has been detected for the first time. Combining our sample with other radio and X-ray catalogs, we have studied the properties of the entire sample of radio/X-ray stars. We conclude that the radio emission can be attributed to two different components: i) highly-variable (flaring) non-thermal radio gyrosynchrotron emission produced by electrons accelerated in the magnetospheres of pre-main sequence low-mass stars; ii) thermal emission due to free-free radiation from ionized gas and/or heated dust around embedded massive objects and proplyds. Based on our detections of radio flares, we have estimated a radio flaring rate of $\sim$0.14 flares day$-$1 in the dense stellar cluster embedded in the Orion Hot Core region. This suggests that radio flares are more common events during the first stages of stellar evolution than previously thought. A comparison between the radio and X-ray population shows that the radio detections have been limited mainly to the brighter X-ray stars, supporting the link between the X-ray activity and the mechanisms responsible of the radio variability. The advent of improved sensitivity with the new VLA and ALMA will dramatically increase the number of low-mass stars in young clusters detected at radio wavelengths, improving our understanding of the origin and nature of this radio emission.		
40	**Rafał SARNIAK**	Software correlator in VLBI and general idea of Baltic Interferometer
In collaboration with Poznań Supercomputing and Networking Center (POWIEW project) author launched DiFX software correlator. A number of tests were made, including network, real data and resources optimization tests. It is also considered the idea of the 4-5 antennas interferometer for regular monitoring of number radio sources – ie. water or methanol masers.		
41	**Yaroslav NAIDEN**	Correlation Properties of the CMB and SDSS at Different Redshifts
We have calculated mosaic correlation maps based on the ILC WMAP microwave background data and infrared and optical extragalactic object positions according to the 2MRS catalog and the SDSS survey respectively. Using the histograms of signal values in pixels and angular power spectra, we have investigated the statistical properties of these maps. Evolution power spectra of correlation maps, depending on z, were built. We show that there are certain correlation scales (2° - 3°) at different redshifts (z = 1-2), which can match the size of the maximal heterogeneity cell (60-90 Mpc) during different cosmological epochs.		

more info at: `http://yerac2014.astro.uni.torun.pl`

Abstracts of posters

1	**Sho NAKAMURA**	A 3D MHD Simulation of Magnetic Fields Evolution in galaxies: Effects of Steady Spiral Arms

We study numerically the large-scale gas and magnetic field evolution of spiral galaxies in the gravitational potential of a bulge, disc, halo and spiral arms. We adopt a steady axisymmetric gravitational potential given by Miyamoto et al. and rigid rotating spiral potential. We carried out 3D MHD simulation taken into account radiative cooling energy loss. Our models demonstrate that the magnetic fields strength is dramatically amplified by isothermal galactic shock in spiral arm region, and the magnetic arms are generated. Magnetic fields around the spiral arms are amplifi ed up to a few μG at 200Myr. After the magnetic fields are amplified, we also show the azimuthal direction of mean magnetic fields in the disc changes with radius due to magneto-rotational instabilities and Parker instabilities at t $\sim$200-500 Myr. The resultant structure of azimuthal magnetic fields distribution is also qualitatively consistent with the observed distribution of the Faraday rotation measure.

2	**Frederic JARON**	Discovery of a periodical apoastron GeV peak in LS I +61°303

LS I +61°303 is one of the few radio to TeV emitting X-ray binaries. On this poster we present the discovery of a periodic apoastron GeV gamma-ray peak and its correlation with radio emission.

3	**Sara CUADRADO**	The complete millimeter line survey of the Orion Bar PDR

UV radiation strongly affects the chemical state of interstellar gas and dust, from protoplanetary disks to entire galaxies. Strongly irradiated photodissociation regions (PDRs) are the transition layers between the ionized gas illuminated by intense UV fields and the cold neutral gas shielded from UV radiation. Despite their relevance in a wider astrophysical context, the observational limits of the chemical complexity in UV-illuminated environments are poorly constrained.
We have performed a complete millimeter line survey of the Orion Bar (the prototypical warm PDR) using the IRAM-30m telescope. Our observations show the chemical richness of the harsh Orion Bar environment. The Orion Bar PDR is characterized by a peculiar chemistry where radicals (OH, C2H, HCO...) and reactive ions (CH+, SO+, HOC+, CO+...) reach high abundances. Half of the detected lines have been assigned to: HCN, HCO, C3H2, HCO+, SiO, C4H, HOC+, CS, H2CO, SO, C2H, H2CS, SO2, HNC, C3H, DCN, HCS+, NS, SO+... The other set of lines comes from isotopologues (D, 13C, 18O, 34S ...) and more complex organic molecules. The latter ones were clearly not expected in a region illuminated by a strong UV field.
In this contribution we present a summary of the complete molecular line survey of the Orion Bar and the preliminary results.

4	**Alicia LÓPEZ JIMÉNEZ**	Organic molecules in Orion-KL

Radio astronomical line survey with the IRAM 30-m telescope have allowed us to observe and identify some of the most abundant complex N-bearing molecules (Ethyl cyanide, Vinyl cyanide) towards Orion-KL Nebula , a source of massive star formation, pointing to the IRc2 source. To deal with the great number of rotational lines produced by these complex organic molecules we have performed spectroscopic and astrophysical analysis in order to refine the physical and chemical conditions of the observed region and to reduce the number of U-lines observed in our line survey. We report on the first interstellar detection of transitions in the v10=1/(v11=1,v15=1) dyad in space, and in the v11=2 and v11=3 states in Orion-KL.

5	**Brenda NAMUMBA**	Evolution of cold gas in galaxies

Cold gas in galaxies has been related to the formation and evolution of galaxies in the recent past as it is a processor of star formation. However, still very little is known about the evolution of cold gas present in galaxies. One of the main goals of this project is to use HI absorption line to study the evolution of cold gas in three active galaxies using the KAT-7 data. This will enable us study the statistical properties of the atomic hydrogen across wide redshift and provide important input on the environment where the cold atomic gas is detected via 21 cm absorption line.

6	**Victor M. RIVILLA**	Short- and long-term radio variability of young stars in the Orion nebula cluster and molecular cloud

We have used the Very Large Array to carry out multi-epoch radio continuum monitoring of the Orion Nebula Cluster and the background Orion Molecular Cloud. Our observations reveal the presence of 19 radio sources, mainly concentrated in the Trapezium Cluster and the Orion Hot Core regions. With the exception of the Becklin-Neugebauer object and the source C the sources all show variability on timescales of months. We find tentative evidence of variability in the emission from the massive protostar Source I. Our observations also confirm radio flux density variations of a factor >2 on timescales of hours to days in 5 sources. One of these flaring sources, OHC-E, has been detected for the first time. Combining our sample with other radio and X-ray catalogs, we have studied the properties of the entire sample of radio/X-ray stars. We conclude that the radio emission can be attributed to two different components: i) highly-variable (flaring) non-thermal radio gyr! osynchrotron emission produced by electrons accelerated in the magnetospheres of pre-main sequence low-mass stars; ii) thermal emission due to free-free radiation from ionized gas and/or heated dust around embedded massive objects and proplyds. Based on our detections of radio flares, we have estimated a radio flaring rate of ~ 0.14 flares day-1 in the dense stellar cluster embedded in the Orion Hot Core region. This suggests that radio flares are more common events during the first stages of stellar evolution than previously thought. A comparison between the radio and X-ray population shows that the radio detections have been limited mainly to the brighter X-ray stars, supporting the link between the X-ray activity and the mechanisms responsible of the radio variability. The advent of improved sensitivity with the new VLA and ALMA will dramatically increase the number of low-mass stars in young clusters detected at radio wavelengths, improving our understanding of the origin and nature of this radio emission.