4 Astrophysics

Wednesday, 2. Sept. 2009, Room F

Time	ID	Astrophysics I *Chair: NN*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00 **➔ *room B***	**421**	**Galaxies in the early Universe** *Daniel Schaerer* *Geneva Observatory, Geneva University, 51, Ch. des Maillettes, 1290 Versoix, Switzerland* I will present an overview of our ongoing projects to study the most distant galaxies using multi-wavelength observations from the VLT, HST, Spitzer, and others, and the power of strong gravitationallensing. These observations provide a first glimpse on the properties of galaxies and their formation and evolution during the first billion years of the universe, and constraints on cosmic reionisation. I will also sketch future perspectives in this field.
14:30	**422**	**The Formation and Evolution of Fossil Groups of Galaxies** *Paul Eigenthaler, Werner W. Zeilinger* *Inst. für Astronomie, Universität Wien, Türkenschanzstraße 17, 1180 Wien, Austria* Poor groups of galaxies are known to be the sites where galaxy-galaxy interactions or even the coalescence of individual galaxies, galaxy merging, take place. Numerical simulations have shown that merging can proceed as long as a single, massive elliptical galaxy surrounded by an extended, diffuse X-ray halo and a faint galaxy population, a so-called fossil group remain as final product. Complementary to previous work we have queried the SDSS database via Structured Query Language (SQL) for new fossil structures. Mid-resolution spectroscopy with ISIS has been carried out at the William Herschel Telescope (WHT) to study the stellar population of fossil group central ellipticals supposed to contain the merger history of the whole group. In addition, VIMOS multi-object spectroscopy is currently carried out at the VLT to study the groups' faint galaxy populations, especially the shape of the optical luminosity function.
14:45	**423**	**Disk galaxy evolution since z=1** *Asmus Böhm* *Institute for Astro- and Particle Physics Innsbruck, Technikerstrasse 25/8, 6020 Innsbruck, Austria* We have constructed a data set of ~200 disk galaxies at redshifts up to z=1(~130 of which show extended rotation curves usable for a determination of the total masses) with Very Large Telescope (VLT) spectroscopy and Hubble Space Telescope imaging. This is one of the largest kinematical samples of distant disks to date.

		The mean stellar mass-to-light ratios evolve more strongly in the low-mass galaxies than in the high-mass galaxies and the mean stellar ages are lower for low-mass galaxies than for high-mass galaxies. This points to an ANTI-HIERARCHICAL evolution of the stellar populations (aka "downsizing"), possibly due to supernova feedback. On the other hand, the stellar-to-total-mass ratios are observed to have remained constant since z~1, which favors a HIERARCHICAL buildup of the dark matter halos the disks reside in. Our data hence point to an opposite evolution of baryonic and dark matter in disk galaxies that is still quite challenging to numerical simulations. We will also present first results from a study of very low- and very high-mass disks; these data are among the deepest spectra of distant galaxies ever taken with the VLT.
15:00	**424**	**The early evolution of tidal dwarf galaxies** *Simone Recchi* *Institute of Astronomy, Vienna University, Türkenschanzstrasse 17, 1180 Wien, Austria* In our effort to understand the origin and evolution of tidal dwarf galaxies and their correspondence with local objects, the first step is to understand how these galaxies (which are supposed to have a limited amount of dark matter) react to the feedback of the ongoing star formation. We make use of 2-D chemodynamical calculations in order to study the early evolution of isolated, dark matter-free dwarf galaxies and we compare the results with dark matter-dominated dwarf galaxy models. All the considered models show that the star formation proceeds for more than 300 Myr, therefore dwarf galaxies without large dark matter halos are not necessarily quickly destroyed. The chemical evolution of these objects is consistent with the main chemical properties of the dSphs of the Local Group. Models with large dark matter halos show results consistent with models free of dark matter, indicating that the distribution of gas is more important than the depth of the potential well in determining the global behavior of dSph-sized dwarf galaxies. Finally, we show models of dwarf galaxies interacting with a giant companion to understand what is the effect of an external tidal field on the dynamical and chemical evolution of such galaxies.
15:15	**425**	**Radio spectral index images of the spiral galaxies NGC 0628, NGC 3627, and NGC 7331** *Rosita Paladino [1], Emanuela Orru' [1], Matteo Murgia [2]* *[1] Institut für Astro- und Teilchenphysik, Technikerstraße 25/8, 6020 Innsbruck, Austria* *[2] Astronomical Observatory of Cagliari, strada 54 Loc. Poggio dei Pini, 09012 Capoterra, Italy* In order to understand the cosmic ray propagation mechanism in galaxies, and its correlation with the sites of star formation, we compare the spatially resolved radio spectral index of three spiral galaxies with their IR distribution. We present new low-frequency radio continuum observations of the galaxies NGC 0628, NGC 3627, and NGC 7331, taken at 327 MHz with the Very Large Array. We complemented our data set with sensitive archival observations at 1.4 GHz and we studied the variations of the radio spectral index within the disks of these spiral galaxies. We also compared the spectral index distribution and the IR distribution, using 70 micron Spitzer observations. We found that in these galaxies

		the non-thermal spectral index is anticorrelated with the radio brightness. Bright regions, like the bar in NGC 3627 or the circumnuclear region in NGC 7331, are characterized by a flatter spectrum with respect to the underlying disk. Therefore, a systematic steepening of the spectral index with the increasing distance from the center of these galaxies is observed. Furthermore, by comparing the radio images with the 70 micron images of the Spitzer satellite we found that a similar anticorrelation exists between the radio spectral index and the infrared brightness, as expected on the basis of the local correlation between the radio continuum and the infrared emission. Our results support the idea that in regions of intense star formation the electron diffusion must be efficient. The observed anticorrelation between RC brightness and spectral index, may imply that the cosmic ray density and the magnetic field strength are significantly higher in these regions than in their surroundings.
15:30	**426**	**Stellar populations in dwarf elliptical galaxies** *Werner Zeilinger* *Institut für Astronomie der Universität Wien, Türkenschanzstraße 17, 1180 Wien, Austria* Dwarf ellipticals are the most numerous galaxy population in nearby dense environments. These low mass systems are very sensitive to both internal and external processes and are therefore ideal to test theories of galaxy formation and evolution. Results based on deep ESO FORS/VLT optical spectra of a sample of dwarf ellipticals are presented. Age and metallicity estimates werde derived for their stellar populations. The dwarf ellipticals of the sample are found to have solar [α/Fe] ratios and mean ages and metallicities in the range of 1-10 Gyr, and -0.7 < [Z/H] < 0. These values suggest that present-day dwarf ellipticals in clusters formed stars until a recent epoch and were self-enriched by a long star formation history.
15:45	**427**	**The Herschel Space Telescope and the Austrian Participation** *Franz Kerschbaum* *Institute for Astronomy, Univ. Vienna, Türkenschanzstraße 17, 1180 Wien, Austria* The biggest space telescope ever, Herschel was successfully launched on May 14, 2009. ESA's Space Horizon 2000 cornerstone mission will perform imaging photometry and spectroscopy in the 60-670 micron range and will address astrophysical questions ranging from our planetary system, the galaxy, the local universe out to cosmological distances. The Austrian participation in one of Herschels instruments, namely PACS is lead by the Institute for Astronomy at the University Vienna and carried out in collaboration with partners at the Technical University, Vienna and Joanneum Research, Graz in the framework of an European consortium. Both the technical contributions in the field of the On-board Data Reduction and Compression as well as the scientific projects in the fields of late stages of stellar evolution and astro-mineralogy are outlined in the contribution. First prospective space based data sets will be available in the late August 2009 timeframe well timed for the conference.
16:00		***Coffee Break***

Time	ID	Astrophysics II *Chair: NN*
16:30	**607**	***see session "Solid State Physics"; → go to room C***
17:00	**431**	**The effect of ram pressure on the star formation, mass distribution and morphology of galaxies** *Wolfgang Kapferer [1], Constantin Sluka [1], Sabine Schindler [1], Chiara Ferrari [2], Bodo Ziegler [3]* *[1] Astro- and Particle Physics, University Innsbruck, Technikerstrasse 25, 6020 Innsbruck, Austria* *[2] Laboratoire Cassiopee, CNRS, Observatoire de la Côte d Azur, BP4229, 6304 Nice Cedex 4, France* *[3] ESO, Karl-Schwarzschild-Strasse 2, 85748 Garching, Germany* We investigate the dependence of star formation and the distribution of the components of galaxies on the strength of ram pressure. By applying a combined N-body/hydrodynamic description (GADGET-2) with radiative cooling and a recipe for star formation and stellar feedback 12 different ram-pressure stripping scenarios for disc galaxies were calculated Several mock observations in X-ray, H\alpha and HI wavelength for different ram-pressure scenarios are presented. The star formation of a galaxy is enhanced by more than a magnitude in the simulation with a high ram-pressure ($5x10^{-11}$ dyn/cm^2) in comparison to the same system evolving in isolation. The enhancement of the starformation depends more on the surrounding gas density than on the relative velocity. Up to 95% of all newly formed stars can be found in the wake of the galaxy out to distances of more than 350 kpc behind the stellar disc.
17:15	**432** **cancelled**	~~**Ram pressure stripping of galactic halos in star forming galaxies**~~ ~~*Verena Baumgartner, Institut für Astronomie, Universität Wien, Türkenschanzstraße 17, 1180 Wien, Austria*~~ ~~*Dieter Breitschwerdt, Center for Astronomy and Astrophysics, Technical University Berlin, Hardenbergstraße 36, 10623 Berlin, Germany*~~ ~~The intracluster medium (ICM) in galaxy clusters contains heavy elements with about 1/3 of the solar abundance. These heavy elements (metals) are the products of stellar nucleosynthesis and are either expelled by galactic winds or lost from the galaxies due to interactions with the intracluster gas.~~ ~~We investigate the stripping of hot galactic, high-metallicity halos, which occurs as galaxies are moving through a cluster, being subject to the ram pressure of the ICM. The aim of our work is to modify the criterion of ram pressure stripping for galactic disks (Gunn & Gott 1972) and to include the internal structure of galactic halos in the calculations. Moreover, the amount of metals present in the halos must be known in detail in order to estimate the contribution of halo stripping to the metal enrichment of the ICM.~~ ~~References: Gunn J.E. & Gott 1972, ApJ 176, 1~~
17:15	**437**	**Enrichment of the intra-cluster medium due to AGN outflows induced by late-type galaxies** *Martin Pancisin, Astro- and Particle Physics, University Innsbruck*

17:30	**433**	**The Infrared Butcher-Oemler Effect: A Statistical Study on a X-ray Selected Sample of Galaxy Clusters.** *Sonia Giovanna Temporin, Institute for Astro- and Particle Physics Innsbruck, Technikerstrasse 25, 6020 Innsbruck, Austria* *Pierre-Alain Duc, CEA Saclay, DSM/IRFU, Service d'Astrophysique, Orme des Mérisiers, Bâtiment 709, 91191 Gif sur Yvette, France* A few recent studies on intermediate redshift galaxy clusters (z >~ 0.3) have revealed a population of (ultra-)luminous infrared sources, that are interpreted as dusty, vigorously star-forming galaxies. This mode of star formation is not observed in clusters in the local universe, where (ultra-)luminous infrared galaxies are not found. This fact suggests that we are in the presence of an infrared Butcher-Oemler effect. For the first time we have investigated this effect in a statistical way, by using an X-ray selected sample of galaxy clusters with a well understood selection function (the XMM-LSS sample) and the Spitzer SWIRE legacy survey which covers the same region of the sky in the IRAC and MIPS bands, notably at 24 μm. We present here the main results of this statistical investigation in the redshift range z ~ 0.05 - 1.05.
17:45	**434**	**Magnetohydrodynamic Simulations of Galaxy Clusters** *Josef Stöckl, Wolfgang Kapferer, Martin Pancisin, Sabine Schindler* *Institute for Astro- and Particlephysics, University of Innbruck, Technikerstr. 25/8, 6020 Innsbruck, Austria* We perform magnetohydrodynamic simulations of the formation of clusters of galaxies including radiative cooling. The applied numerical setup is based on FLASH 3 and enables us to investigate the influence of magnetic fields on the structure formation of clusters of galaxies. In addition we study the behaviour of magnetic fields in interaction processes of cluster galaxies with their environment. We found that cosmological magnetic seed fields in the range of 10^{-12} to 10^{-11} G are amplified during structure formation in the vicinity of galaxy clusters by six orders of magnitudes, which is in good agreement with the observed magnetic field strength in local galaxy clusters. Furthermore we present the influence of magnetic fields in the process of ram-pressure stripping in spiral galaxies.
18:00	**435**	**Magnetic fields in clusters of galaxies: The relation between X-ray brightness and Faraday Rotation Measures** *Julia Weratschnig [1], Sabine Schindler [1], Klaus Dolag [2]* *[1] Inst. of Astro- and Particle Physics, Technikerstraße 25, 6020 Innsbruck, Austria* *[2] Max-Planck-Institut für Astrophysik, Karl-Schwarzschild-Str. 1, 85748 Garching, Germany* The connection between magnetic fields and the X-ray luminosity in clusters of galaxies is studied in order to gain knowledge about the nature and clarify the origin of the magnetic fields. By comparing the root mean square of the Faraday Rotation Measure with the X-ray brightness important information obout the magnetic fields in a cluster of galaxies can be deduced. We present results obtained with XMM-Newton and VLA observations, which support a magnetic field which is frozen into the intra cluster medium. We also see evidence for mergers enhancing the magnetic field strength.

18:15	**436**	**Consequences of AGN energy feedback on the ICM** *Stefanie Unterguggenberger, Wolfgang Kapferer, Sabine Schindler* *Institute of Astro- and Particlephysics, Technikerstrasse 25, 6020 Innsbruck, Austria* We investigate the energy contribution by jets of active galactic nuclei (AGN) to the intra-cluster medium (ICM). The AGNs are triggered by major mergers of late-type cluster galaxies. We investigate the dependence of ICM heating by AGNs on different AGN accretion rates, different lengths of duty cycles and different mass thresholds of merging galaxies for two model clusters. The cluster components are simulated by a combination of N-body (dark matter), hydrodynamic (ICM) and semi-numerical galaxy-formation (galaxies) techniques. We find that AGN energy feedback does not increase the temperature of the ICM at low redshifts. At high redshifts (z ~ 1) the thermal feedback increases the temperature of the galaxy clusters significantly.
18:30		***END***

Time	ID	Astro- and Particle Physics I *Chair: S. Schindler, Uni Innsbruck*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	**361**	***see session "Nuclear and Particle Physics"; ➔ go to room B***
14:30	**441** **cancelled**	~~**Search for a neutrino flux from Fermi blazars with IceCube**~~ ~~*Levent Demirörs*~~ ~~*Ecole polytechnique fédérale de Lausanne, SB IPEP LPHE1, BSP 611, 1015 Lausanne, Switzerland*~~ ~~The IceCube neutrino observatory is currently under construction at the South Pole. When completed, its deep ice detector will instrument a fiducial volume of one cubic kilometer. Viewing the deep ice with 4800 optical modules, arranged in 80 strings of 60 modules each, it will tag neutrinos by detecting the Cerenkov light emitted by neutrino-induced leptons and hadronic showers. The main scientific goal of the IceCube project is the detection of neutrinos originating from outside our solar system.~~ ~~In this presentation we will describe the search strategy for point sources of astrophysical neutrinos in the northern hemisphere. The data was collected with the IceCube 22 string configuration in 2007/2008. The final dataset will be compared to a source list compiled from blazars published in the first Fermi catalog.~~
14:45	**442**	**The Search for Dark Matter with the XENON Experiment** *Roberto Santorelli* *University of Zürich, Winterthurerstrasse 190, 8057 Zürich, Switzerland* The XENON Dark Matter Project aims to directly detect WIMPs (Weakly Interacting Massive Particles) with a dual phase xenon Time Projection Chamber (Xe-TPC). The XENON100 detector, a 170 kg Xe-TPC, is currently under commissioning at Gran Sasso laboratory. Based on a similar dual-phase design as XENON10, XENON100 provides an increase in fiducial target mass by a factor of 10 with 100 times lower background rate. The 65 kg Xe-TPC is instrumented with 178 PMTs and it is surrounded by 105 kg LXe active veto with an additional 64 PMTs. First tests have been carried out, and the WIMP search data taking will start in 2009. In this talk the science prospects, the many new relevant developments for this detector, as well as the results from preliminary studies about the detector performances will be introduced.

15:00	**443**	**Results from the search for WIMPs with the CDMS experiment** *Sebastian Arrenberg* *Physics Department, University of Zürich, Winterthurerstr. 190, 8057 Zürich, Switzerland* The Cryogenic Dark Matter Search Experiment (CDMS) employs a total of 30 Germanium and Silicon Detectors at the Soudan Underground Laboratory to detect weakly interacting massive particles (WIMPs) via their elastic scattering from the target nuclei. In February 2008 the collaboration released their last results, yielding a world-leading limit for spin-independent WIMP-nucleon cross sections for WIMP masses above 42 GeV/c^2, restricting significant parts of the parameter space favored by supersymmetric models. Currently, data from four consecutive runs between July 2007 and October 2008 is under analysis with the prospect of increasing the sensitivity by a factor of ~4. We will present the results emerging from this analysis.
15:15	**444**	**Support Experiments for Neutrinoless Double Beta Decay** *Peter Grabmayr, Kepler Centre for Astro and Particle Physics, Auf der Morgenstelle 14, 72076 Tübingen, Germany, for the GERDA collaboration* The understanding of neutrino properties is of paramount importance for Particle and Astro Physics. The neutrinoless double beta decay ($2\beta0\nu$) is a second order weak allowed transition which violates lepton number conservation by 2 and thus leads beyond the Standard Model. The observation of a $2\beta0\nu$ decay is the only proof of the possible Majorana nature of the neutrino. In addition, if theory provides precise matrix elements for this transition the effective neutrino mass can be deduced from the long half lives in the order of 10^{25} and beyond. Experimentally, background reduction and radio purity is a major task and thus these experiments are build underground. On the other hand the nuclear structure models must be tested for their reliability. As the GERDA experiment searches for the $2\beta0\nu$ decay in ^{76}Ge the present support experiments center around this mass region. Neutron capture experiments investigate the cross section and the gamma decay of ^{77}Ge, its isomers and its daughters, as there are β and gammas emitted with energies close to $Q_{\beta\beta}$. Secondly, neutron and proton transfer experiments have been performed at various facilities in order to nail down nuclear structure of the initial and final nuclei, i.e. ^{76}Ge and ^{76}Se. Modifications of the models are discussed.
15:30	**445**	**A Novel Camera Type for Very High Energy Gamma-Astronomy** *Thomas Krähenbühl for the FACT project, ETH Zürich, Schafmattstrasse 20, 8093 Zürich, Switzerland* The significant progress of semiconductor photodetectors in the past years, resulting in the development of Geiger-mode avalanche photodiodes (G-APD), allows to realise a novel camera type for imaging air Cherenkov telescopes. The project 'First G-APD Camera Test' (FACT), initiated by ETH Zurich, uses G-APDs to measure Cherenkov light from airshowers originating from very high energetic gamma-rays. G-APDs offer enhanced properties compared to standard photomultipliers (e.g. compactness, homogeneous angular acceptance and tolerance of bright light). The camera is foreseen for the DWARF telescope which will be dedicated to the long-term monitoring of bright blazars.

15:45	**446**	**A Design Study of a trigger-less Signal Reconstruction, an Active Mirror Control and a Light Collecting System in the framework of the Cherenkov Telescope Array (CTA)** *Ben Huber, Arno Gadola* *Physik-Institut, Winterthurerstrasse 190, 8057 Zürich, Switzerland* The Physik-Institut at the Universität Zürich is involved in the general design study of the future Cherenkov Telescope Array (CTA). The feasibility studies include the prototyping of Active Mirror Control (AMC) devices, which are used to align the single mirror segments of a Cherenkov telescope. Together with our colleagues from the ETH Zürich, a light collecting system for the telescope camera, composed of solid Plexiglas cones, is designed and investigated in detail. Furthermore, our efforts are dedicated to a trigger-less signal reconstruction method using cross-correlation algorithms. Detailed software-based testing has already been performed and hardware implementation is part of the future plans. This talk will present the basics and current results of the different topics.
16:00		***Coffee Break***
		Astrophysics III *Chair: NN*
16:30 **➔ *room B***	**451**	**Results from the MAGIC Telescope** *Daniela Dorner, ISDC, Chemin d'Ecogia 16, 1290 Versoix, Switzerland, on behalf of the MAGIC collaboration* MAGIC is a major atmospheric imaging Cherenkov experiment situated on the Canary Island of La Palma. Recently, it was upgraded with a second telescope. While the comissioning of the stereo observations is currently going on, the first telescope delivered already many interesting results in five years of operation. Among the major Imaging Air Cherenkov Telescopes in operation, MAGIC reaches the lowest energy threshold. This unique feature allowed the discovery of VHE gamma rays from 3C279, the farthest Blazar detected in VHE, as well as the first observation of the VHE pulsed emission from the Crab pulsar. In addition, a number of galactic and extra-galactic sources have been discovered or confirmed. Moreover, MAGIC has constrained limits on Quantum Gravity Mass Scale, Extra-galactic Background Light and gamma-ray fluxes from Dark Matter annihilation. With the second telescope, the angular and energy resolution will be improved and the background reduced.
17:00	**36**	***Winner of the ÖGAA Diploma Award***

17:15	**452**	**Accurate sky background modelling for ESO facilities** *Wolfgang Kausch, Marco Barden, Stefan Kimeswenger, Stefan Noll* *Institute of Astro- and Particlephysics, University of Innsbruck, Technikerstr. 25/8, 6020 Innsbruck, Austria* Ground-based measurements like e.g. high resolution spectroscopy are heavily influenced by several physical processes. Amongst others, line absorption/ emission, air glow by OH molecules, and scattering of photons within the earth's atmosphere make observations in particular from facilities like the future European Extremely Large Telescope a challenge. Additionally, emission from unresolved extrasolar objects, the zodiacal light, the moon and even thermal emission from the telescope and the instrument contribute significantly to the broad band background over a wide wavelength range. In our talk we review these influences and give an overview on how they can be accurately modeled for increasing the overall precision of spectroscopic and imaging measurements.
17:30	**453** **cancelled**	~~**The European Virtual Observatory (EURO-VO)**~~ ~~*Florian Freistetter, Astronomisches Rechen-Institut Heidelberg, Mönchhofstraße 12-14 , 69120 Heidelberg, Germany*~~ ~~A Virtual Observatory (VO) provides a platform to support modern astronomical research by offering fast and easy access to astronomical data archives and related documentation worldwide as well as highly sophisticated software tools for exploiting this data.~~ ~~A huge amount of astronomical data (both, observational and theoretical) is produced every day by astronomers worldwide. The aim of the VO is to collect as much of this data as possible and store and present it in a useful way, so that other scientists can use this existing data for their own research projects. There are several national VOs (e.g. the German Astrophysical Virtual Observatory GAVO) but recently a project funded by the EU has been launched to create a European Virtual Observatory (EURO-VO).~~ ~~This presentation will explain the work and purpose of EURO-VO and give examples on how the data in the VO can be used for scientific, educational or outreach-projects.~~
17:45	**454**	**Multichannel matched filtering** **for spherical gravitational wave antennas** *Carlos Filipe Da Silva Costa, Stefano Foffa* *Université de Genève, 24 Quai Ernest-Ansermet, 1211 Genève 4, Switzerland* I will present some results about the performance of a multidimensional matched filter as a follow-up module of the coherent wave-burst method developed by our group for the detection of gravitational wave bursts by spherical resonant detectors. Applying the matched filter after the coherent wave-burst sensibly improves the determination of relevant parameters as the arrival time, amplitude, central frequency and arrival direction of the signal. We have also optimized our parameters search algorithms to keep the computational time low.

18:00	**455**	**Abundance driven Asymmetry in Planetary Nebulae** *Stefan Kimeswenger* *Astro- and Particle Physics, Techikerstraße 25, 6020 Innsbruck, Austria* Planetary nebulae (PNe) are the last step in stellar evolution before the grave of a white dwarf for normal stars. While in the past spherical shells were assumed, and still are used in modeling, we know that round planetary nebulae are the minority of objects. There is a lot of discussion ongoing how to build an asymmetric nebula - the main topic is transfer of angular momentum either from orbits of planets or stellar companions, or stellar rotation. In case of those objects that underwent a very late helium flash (called VLTP or "born-again" PNe) it seems to be easier to investigate. The first, hydrogen rich PN, is more or less round always. The ejecta from the VLTP building a second nebula is extremely asymmetrically. Angular momentum is mostly assumed to be the main reason for the asymmetry in PNe. I present here the observational results and ideas how such a strong link with the abundance of the ejecta changing the physical properties of the momentum transfer.
18:15	**456**	**Comparative Finite-Element Modeling of Resonant Spherical Cavity Phenomena (Schumann Resonances) in the Atmospheres of Earth and Titan** *Ernst Zinterl [1], Bruno Besser [2], Johann Riedler [3], Willibald Riedler [4], Konrad Schwingenschuh [2], Helmut Rucker [2]* *[1] Inst. of Nanostructured Materials and Photonics, Joanneum Research Forschungsges, Franz-Pichler-Strasse 30, 8160 Weiz, Austria* *[2] Space Research Institute, Austrian Academy of Sciences, Schmiedlstrasse 6, 8042 Graz, Austria* *[3] Tech. Bureau Riedler, Brückengasse 6, 8073 Feldkirchen bei Graz, Austria* *[4] em. Inst. of Comm. Networks and Satellite Comm., TUG, Inffeldgasse 12/I, 8010 Graz, Austria* In 1952 Winfried O. Schumann predicted a resonant cavity with conductive Earth surface and conductive ionospheric layer acting as concentric spherical boundaries. This zero order model was verified by measurements and investigations of M. Balser and C.A. Wagner in 1960. In the subsequent years space missions augmented the knowledge base about atmospheric phenomena in our Solar System so that more realistic models of resonant phenomena could be established. In this paper the acquaintance of differing atmospheric layer structures and physics of Earth and Titan, the most massive Saturnian satellite, supported by recent deliverables of space missions, are the source for comparative Finite-Element Method (FEM) modeling and simulations of resonant cavity phenomena on these specific Solar System bodies.
18:30		***END***
19:30		***Conference Dinner***

Time	ID	ÖGAA Mitgliederversammlung *Chair: S. Schindler, Uni Innsbruck*
09:00		***PLENARY SESSION***
12:40		***Postersession, Lunchbuffet***
14:00	**391**	***see session "Nuclear and Particle Physics"; ➔ go to room B***
14:30		***ÖGAA Mitgliederversammlung***
16:00		***Coffee Break***
		Astro- and Particle Physics II *Chair: NN*
16:30	**34**	***see session "Nuclear and Particle Physics"; ➔ go to room B***
16:45	**461**	**Modeling of Cosmic Ray Electron Transport in Disk and Halos of Star Forming Galaxies** *Ingo Philipp [1], Dieter Breitschwerdt [2], Michael Dahlem [3], Crystal Brogan [4], Volker Heesen [5], Ralf-Jürgen Dettmar [5]* *[1] Institute of Astronomy, Türkenschanzstrasse 17, 1180 Vienna, Austria* *[2] Center for Astronomy and Astrophysics, Hardenbergstraße 36, 10623 Berlin, Germany* *[3] CSIRO/ATNF Paul Wild Observatory, Locked Bag 194, 2390 Narrabri NSW, Australia* *[4] National Radio Astronomy Observatory, Edgemont Road 520, 22903 Charlottesville, United States* *[5] Astronomisches Institut der Ruhr-Universität Bochum, Universitätsstraße 150, 44780 Bochum, Germany* Cosmic ray (CR) electrons are an essential component of the primary cosmic radiation. Although they constitute only a few percent of the CRs – they provide most of the information we have regarding the interstellar CR propagation and confinement in galaxies and clusters. The understanding of their production and their interaction with magnetic and radiation fields is thus of fundamental importance. Therefore, we have calculated analytically a series of one-dimensional, stationary CR electron transport models based on diffusion and advection in order to get insight into the relations between the quantities involved. These are compared to high resolution multifrequency radio continuum observations of the actively star forming edge-on spiral galaxies NGC 891 (VLA) and NGC 253 (VLA & Effelsberg) obtained by us. These studies provide constraints on the main parameters of the CR electron propagation. Our results favour advection of CR electrons as the dominant transport process in the halos of actively star forming galaxies with diffusion dominating in the disk and lower halo. For the first time transport models including both, diffusion and advection, have been used to interpret radio spectral index distributions with high angular resolution.

17:00	**462**	**Deriving Cosmic Ray spectra beyond the knee in galactic wind shocks** *Georg Zwettler, Institute of Astronomy, University of Vienna, Türkenschanzstraße 17, 1180 Vienna, Austria* *Dieter Breitschwerdt, Zentrum für Astronomie und Astrophysik, Technische Universität Berlin, Hardenbergstraße 36, 10623 Berlin, Germany* Particle energies of Galactic Cosmic Rays (GCRs) span a wide range from ~10^9 - 10^{21} eV. The energy spectrum of the particle flux is a powerlaw with a steepening at around 10^15 eV, the knee, and a flattening at ~10^18 eV, the ankle. Diffusive shock acceleration quite naturally leads to such a powerlaw. First order Fermi acceleration in SNR shocks is generally considered to be responsible for the differential energy spectrum up to 10^15 eV. However, the origin of CRs beyond the knee still remains under discussion. We consider galactic wind shocks, originating in Star Forming Regions and moving through the halo, as possible sources of energetic particles between the knee and the ankle. If theese shocks are strong they can reaccelerate galactic cosmic rays to significantly higher energies. We describe galactic winds in a flux tube geometry. By using singular perturbation methods we find approximate solutions for the Fokker-Planck Equation in these coordinates. The dependancy of the spectral index of the particle distribution function is discussed for M82-like galactic wind shocks.
17:15	**463**	**Evolved stars in stellar clusters** *Thomas Lebzelter* *Institut für Astronomie, Türkenschanzstrasse 17, 1180 Wien, Austria* Stellar clusters provide an excellent test bed for constraining stellar evolution models. In our project we focus on the stars on the Asymptotic Giant Branch investigating variability, abundance pattern and mass loss. Using masses and metallicities derived from the cluster population we compare our measurements with model predictions. In this talk we will present a few recent highlights from our project.
17:30		***END***
19:30	**21**	***Public Lecture***

ID	Astrophysics Poster
486	**The evolution of high-velocity clouds** *Bastian Arnold* *Institute of Astronomy, University of Vienna, Türkenschanzstr. 17, 1180 Vienna, Austria* We carried out three-dimensional simulations of high-velocity clouds (HVCs) using the adaptive-mesh code Flash. We aim at investigating the evolution of a HVC while it penetrates into the hot galactic halo. The processes of heating, cooling, and saturated heat conduction are considered. It was shown in previous works (Vieser & Hensler, 2007, A&A, 472, 141; Vieser & Hensler, 2007, A&A, 475, 251), that saturated heat conduction suppresses the occuring hydrodynamical instabilities and therefore the life time of the cloud is significantly extended. Hence, a necessary condition is given for prospective star formation in HVCs. Within this work we wish to figure out further processes being able to trigger Jeans instabilities in many regions of the HVC, such that a massive star burst can be initiated.
487	**AGN at z~0.7 are not triggered by major mergers** *Asmus Böhm* *Institute for Astro- and Particle Physics Innsbruck, Technikerstrasse 25/8, 6020 Innsbruck, Austria* It is now commonly accepted that a fundamental link exists between the bulge component of galaxies and the Supermassive Black Holes (SMBH) which are found in their centers. But which process turns a quiescent SMBH into an Active Galactic Nucleus (AGN)? One theoretically motivated answer to this fundamental question is that galaxy interactions and/or mergers can trigger gas inflows to feed the SMBH. The observational results obtained so far however are controversial. We use Hubble Space Telescope data of ~20 AGN and ~200 quiescent (non-AGN) galaxies at redshift z~0.7 selected from the GEMS and STAGES surveys to perform a comparison between AGN and quiescent galaxies that are matched in all parameters like redshift, brightness etc. We analyze the morphologies of the galaxies in terms of their concentration C, asymmetry A, Gini and M20 indices. We find NO increased fraction of strongly disturbed morphologies among AGN hosts with respect to the quiescent population, ruling out major mergers as the main driver of AGN activity at the comic epoch under scrutiny.
488	**Automatic Monte Carlo Production and Data Analyis for Imaging Air Cherenkov Telescopes** *Daniela Dorner, ISDC, Chemin d'Ecogia 16, 1290 Versoix, Switzerland* The current and future generation of Imaging Air Cherenkov Telescopes has to deal with large amounts of data and huge numbers of files. Not only analysis, but also production and processing of simulated data require an automatic procedure. In the framework of 'MARS - CheObs ed.', a flexible automation concept has been developed. It is applied in differnt projects and data centers in Switzerland and Germany. In MAGIC, it is running successfully since more than five years providing an automatic analysis of all data. For the emerging DWARF project, which aims at long-term monitoring of bright AGN in the TeV energy range, the automated production of simulated data is vital. It enables detailed studies comparing different designs. In the analysis, proper simulations, taking into account detector performance and observation conditions, are mandatory to guarantee consistent conclusions on the physics for data spanning over long time periods.

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MARS - CheObs ed.

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With the MAGIC experiment, the software development of the Modular Analysis and Reconstruction Software (MARS - CheObs ed.) has been started. In the past years, it has been continuously enhanced. With its simplicity and the contained automation technology, a powerful package has been designed, best suited to non-interactively analyze the huge amount of data produced daily, by the current and future generation of imaging air-Cherenkov telescopes. As consistent step in the design for the event based analysis, a layer for detector simulation has been included, which also processes individual events, i.e. simulated air-showers. Obviously, having the same framework for the simulation as for the analysis has the advantage that for the simulation, all tools already contained are provided as, for example, logging, I/O, graphical display and naturally all analysis tools. Currently, the software is used in several experiments, as MAGIC, DWARF and CTA.

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Exotic Life Markers in Potential Planetary System Habitats

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Questions like "Are we alone in the universe?", "How unique is the Earth as a planet?" or "How unique is water-based life in the universe?" still are nowhere near to being answered. In recent years, discussions of these topics are more and more influenced by questions whether water is really the only possible solvent, or which conditions are necessary for life to evolve generally in planetary habitats. A change in our present geocentric mindset is required, in order to address these new questions. The University of Vienna has started a new research platform on this topic, where potential planetary systems should be identified and investigated regarding their possibilities for exotic life. Exotic life means in this context not necessarily life which is based on a double bond between carbon and oxygen and also not necessarily water as the only solvent considered Knowledge on such habitats and physical requirements for the origin and evolution of exotic life will also enable future space missions to search specifically for these exotic biomarkers.

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Head Tail High Velocity Clouds: A possibility to test the theory of dark matter subhaloes.

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Assuming an extragalactic origin for the ensemble of compact high velocity clouds (CHVCs) and an amount of dark matter arising from cosmological Lambda-CDM theory, the CHVCs should be embedded in dark matter subhaloes when entering the galactic gravitational potential. The baryonic matter interact with the hot halo gas and face ram pressure stripping as well as a deceleration relative to the motion of its own dark matter potential, which is not affected by drag force.
Based on a stable selfgravitating gas sphere in both hydrodynamic and thermal equilibrium (several heating and cooling processes are considered) surrounded by a hot ambient medium, this work shows how different additional gravitational potentials influence the effect of ram pressure stripping. This setup models the infall of observed CHVCs with a head-tail structure, using hydrodynamic FLASH Code 2.5.

492 Hierarchical star formation in Local Group galaxies

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Star formation appears to be clumped into a hierarchy of structures, from giant molecular clouds down to individual cores and clusters, which are often hierarchical themselves, showing significant substructure. We apply different statistical methods, in particular the nearest neighbour and the minimum spanning tree (MST) method to the resolved stellar populations of Local group galaxies. We present our analysis of clustered star formation as it is demonstrated through the detection of structures of young stellar populations from parsec-scale subclusters of pre-main sequence stars in star forming regions of the Magellanic Clouds to large young stellar aggregates and complexes in the dwarf star-forming galaxy NGC 6822.

493 Narrowband Photometry and Evolution of Galaxies in Abell 1656 (Coma Cluster)

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Hierarchical and Monolithic collapse models forms the basis for our understanding of the galaxy formation in the universe. Ages of the first stars, marks an important parameter in studying the early type galaxies, in field and clusters. The strömgren uvby filters is a perfect and powerful tool for the determinations of stellar parameters (e.g age, metallicity, surface temperature), in elliptical galaxies, and also has been used to investigate the spectrophotometric evolution of elliptical galaxies. The uniqueness of this technique is to observe the change in colors, of stars with short exposure imaging and also poses the advantage of breaking the age-metallicity degeneracy problem (Worthey, 1999).
Rakos et al. (2007) has successfully shown, using the color-magnitude studies of existence of bi-modal feature of galaxy populations at low z, which have also been confirmed by Strateva et al. (2001), Blanton et al. (2003). Using the same feature of narrowband multi color and color-magnitude diagrams we exhibit our recent work with Abell 1656 (Coma Berenices) a dense, elliptical rich cluster with wide range of metallicity and displaying bi-modality with our age sensitive indices, hinting to the fact that majority of galaxies have red, passive colors usually associated with ellipticals and S0 morphologies.

494 A multi-phase ISM code including AGN feedback

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Active galactic nuclei (AGN) activity is supposed to be an essential ingredient during early galactic evolution. In order to study galaxy interactions in the early universe, AGN feedback has been implemented in a multi-phase interstellar medium (ISM) code developed by Stefan Harfst et al. [1]. The multi-phase nature of the ISM is realized by using the sticky particle method to describe the clumpy molecular clouds and smoothed particle hydrodynamics

to describe the diffuse warm and hot ISM. In addition, the code allows for the exchange of matter and momentum between the phases, energy dissipation, star formation and associated feedback. This enables an analysis of the distribution of different gas phases with and without the impact of supermassive black holes in the center of galaxies.

[1] Harfst, S., Theis, C. & Hensler, G., A&A, 449:509-518, 2006

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How does the Local Bubble connect with the ^{60}Fe anomaly in the hydrogenetic ferromanganese crust?

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The deep oceans crust 237KD analysed by Knie et al. (2004) shows a significant increase of the radioisotope ^{60}Fe 2.2 Myr ago. Since ^{60}Fe is produced in supernova (SN) explosions, it is assumed that one or more SNe must have exploded in the solar vicinity to eject enough enriched material to be deposited on earth. The LB, an X-ray emitting HI deficient cavity in the local ISM, was presumably produced by 14 - 20 SN explosions in a moving group around 10-15 Myr ago (Fuchs et al. 2006), which crossed the solar neighbourhood. Calculating backwards in time we find that the trajectories of this group had a minimal distance of about 65 pc around 2.2 Myr ago. In order to determine the fraction of ^{60}Fe raining down on Earth, we tested a SN model developed by Kahn (1998), which describes the expansion of a SN shell in an ambient medium, which was modified by a previous SN explosion. We thus compute analytically the time the SN remnant shell takes to hit the Earth and how much ^{60}Fe will be deposited there as a function of time. We find that our calculations can reproduce the ^{60}Fe measurements, and in particular the peak deposition, fairly well.

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Interferometry of C-rich AGB stars

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Due to pulsation, mass loss and the enrichment of the ISM, the study of C-rich star is of particular relevance for understanding late stage of stellar evolution and the chemical evolution of galaxies. Because of their large size and brightness in the red and infrared these objects are perfect candidates for interferometric investigation. We present the first theoretical study on center-to-limb variation properties and relative radius interpretation for narrow and broad-band filters, on the basis of a set of dynamic model atmospheres of C-rich AGB stars. We investigate the dependence of radius and visibility profiles upon the wavelength and pulsation phase. The synthetic profiles are compared with VINCI and MIDI data for the C-rich star RScl. This allows us to derive the dynamic processes at play within the close environment of the star where the mass-loss mechanism forms.