

Galaxies in Isolation: Exploring Nature vs. Nurture

May 12th-15th, 2009 · Granada (Spain)



Talks abstracts

Author(s): H. B. Ann (Pusan National University, Korea)

Title: Isolated Galaxies and Isolated Satellite Systems

Abstract: We have searched for isolated galaxies using the SDSS DR7. Our primary sample consists of galaxies that have SDSS spectra with $z < 0.05$ but we added bright galaxies that have SDSS images with no SDSS spectra. We gathered the redshifts of the bright galaxies from various catalogs including NED. The total number of sample galaxies is about 100000 of which we found about 12500 and 2600 isolated galaxies if we set isolation criteria of 1 Mpc and 2 Mpc, respectively, with velocity constraint of $\Delta V = 1000 \text{ km/s}$. We also searched for isolated bright galaxies that host satellites which are fainter than 1 mag than their host galaxies. We will present the results of a detailed analysis of the physical properties of isolated galaxies as well as the isolated satellite systems and their environment.

Author(s): F. Annibali (OAPD, Italy), A. Bressan (OAPD, Italy), R. Rampazzo (INAF, Italy), M. Clemens (OAPD, Italy), P. Panuzzo (CEA, France)

Title: The evolution of field early-type galaxies and the origin of their ionized gas

Abstract: We have acquired high signal-to-noise optical spectra for a sample of 65 nearby early type galaxies (ETGs) showing evidence of emission lines. The spectral coverage and the high quality of the spectra allowed us to derive Lick line-strength indices and to study the stellar population properties of the galaxies at different galacto-centric distances. The ETGs of our sample show a wide range in their luminosity-weighted ages, from 1-2 Gyrs up to a Hubble time. Environment seems to play a fundamental role in the evolution of these systems, in the sense that the youngest galaxies are those residing in the lowest density environments. We interpret these very young mean ages as due to some amount of recent star formation. More recently, we have performed a study of the emission line properties of the sample galaxies in order to understand the emission mechanism and its possible connection with the occurred star formation history. According to classical diagnostic diagrams, the majority of the galaxies in our sample are LINERs. In this talk I will discuss our new results, and I will show what they tell us about the still debated mechanism that powers LINERs.

Author(s): E. Athanassoula (LAM/OAMP, France)

Title: Formation and evolution of galactic structures: Nature versus nurture

Abstract: Galaxies have a number of components and subcomponents, such as discs, bulges, bars, inner bars, spirals, rings, shells, bridges and tails etc. In this talk I will review their formation mechanisms and their structures and discuss to what extent these can result from an isolated evolution and to what extent they rely on major or minor interactions and mergers.

Author(s): A. Bosma (LAM/OAMP, France), D. A. Gadotti (MPA Garching, Germany), W. J. G. de Blok (Capetown University, South Africa), E. Athanassoula (LAM/OAMP, France)

Title: Kinematics of the barred spiral galaxy NGC 1291

Abstract: We present new stellar kinematic data of the face-on barred spiral galaxy NGC1291, a S0/a galaxy with an outer ring and a double bar, obtained with the VLT/Giraffe. Surface photometry data based on a Spitzer IRAC 3.6 micron image, and kinematical information for the neutral gas from ATCA data have also been obtained. A comparison is made with numerical simulations of the dynamical evolution of a disk galaxy. This indicates that the bar in this galaxy probably evolved in a dark matter halo which did not dominate the inner parts of the galaxy.

Author(s): N. Brosch (Tel Aviv University, Israel)

Title: Quest for really isolated galaxies and preliminary results

Abstract: In an attempt to understand the neighbourhood density link with star formation in galaxies we studied samples of galaxies in the Virgo Cluster and compared them to isolated galaxies. Preliminary reports of these studies will be presented.

Author(s): F. Combes (LERMA, Observatoire de Paris, France)

Title: Main future issues and how to tackle them on the theoretical side

Abstract: From the main questions debated in the meeting, I will discuss some essential problems to be addressed by future studies and numerical simulations: is the downsizing puzzle a fundamental effect of environment? What is the relative role of nature and nurture in determining galaxy morphology, star formation and galaxy evolution with redshift? Do isolated galaxies exist in simulations?

Author(s): S. Côté (Herzberg Institute of Astrophysics, NRC, Canada), A. Draginda (HIA, Canada), E. Skillman (U Minnesota, USA), B. Miller (Gemini Observatory, Chile)

Title: Transition Dwarf Galaxies in Nearby Groups of Galaxies

Abstract: We present an H α imaging survey of dwarf irregular galaxies (dIs) in two of the most nearby groups of galaxies (Sculptor and Centaurus A groups). Most of the galaxies in the group now have fairly accurately known distances, which enables us to obtain relative distances between dwarfs and larger galaxies of the group. We find that the dIs star formation rates do not depend on local environment, and in particular they do not show any correlation with the distance of the dI to the nearest large galaxy of the group. We show that, similarly to the Local Group, there is a clear morphology-density relation in these two groups of galaxies, in the sense that early-type dwarf galaxies (dEs/dSphs) tend to be at small distances from the more massive galaxies of the group, while dIs are on average at larger distances. Is this due to nature or nurture? Several transition dwarfs are found in each group, dwarfs that show characteristics of both dE/dSphs and dIs, and which contain cold gas but no current star formation. Interestingly the transition dwarfs have an average distance to the more massive galaxies which is intermediate between those of the dEs/dSphs and dIs, and which is quite large (over half a Mpc). This large distance poses some difficulty for the most popular scenarios proposed for transforming a dI into a dE/dSph (ram-pressure with tidal stripping or galaxy harassment). If the observed transition dwarfs are indeed missing links between dIs and dE/dSphs, their relative isolation makes it less likely to have been produced by these mechanisms.

Author(s): D. Croton (Centre for Astrophysics & Supercomputing, Swinburne University, Australia)

Title: How empty is empty?

Abstract: I will review how we define the under-dense and "void" regions in the Universe and how such definitions change (or don't change) the scientific conclusions we draw. Importantly, can we find an "optimal" definition for environment or will our method always be directed solely by the science question at hand?

Author(s): R. Domínguez-Tenreiro (Universidad Autónoma de Madrid, Spain)

Title: Galaxies in Groups vs Isolated Galaxies from Hydrodynamical Simulations

Abstract: We present the results of group galaxy identifications in large volume cosmological simulations, at different redshifts. The simulations begin at very high redshift ($z=50$) as a field of mass density perturbations consistent with the anisotropy of the CMB (WMAPS data). Groups formed in these simulations are embedded in a dark matter halo and in a X-ray emitting diffuse gas corona. The galaxies have different morphologies, and properties consistent with observations. We report on their formation (mass assembly and star formation rates) and compare their details with galaxies formed in isolation.

Author(s): D. Dultzin (UNAM, Mexico)

Title: The Influence of Circumgalactic Environment in Inducing Activity in Galaxies

Abstract: We review the biases which have led to contradictory results on the effects of interactions in triggering activity in galaxies. We can now neatly show that Sy2s are in close (<100 KPCs) physical interaction with the same frequency as most Starburst galaxies, and this frequency is significantly higher than the one for Sy1s which in turn, is similar to the one for "normal" (non-active) galaxies. We also study the effects of the interaction on all the physically close neighbours of our sample of AGN. Next, we present results from a complementary approach: the analysis of the incidence of activity in close pairs. For this we carried out observations for a well defined sample of interacting galaxies: The isolated mixed morphology (E+S) pairs. One result indicates that AGN activity tends to appear in pairs of galaxies which are physically closer to one another. A striking result is that only ONE, out of 39 clear-cut AGN in our sample, is of type 1. This frequency of type 1 activity is too low to be explained with an obscuration/orientation effect alone. We discuss an alternative -though inclusive- model to the so called "Unified Model".

Author(s): D. Espada (Harvard-Smithsonian Center for Astrophysics, USA / IAA-CSIC, Spain)

Title: Setting the normalcy level of HI properties in isolated galaxies

Abstract: In this talk I will show why studying the most isolated galaxies is essential to quantify the normalcy of gaseous disks properties. First, I will revise the effect of the environment on the HI deficiency in galaxies. To do so I will emphasise the need of homogenising the derived parameters for both HI and optical properties in order to compare different samples. Second, I will revisit the usually accepted result that even half of the isolated galaxies show perturbed HI disks, similarly to galaxies in dense environments. This is certainly a striking result if these are supposed to be the most relaxed systems, and would have interesting implications on the HI disk relaxation time scales and the most frequent perturbing mechanisms in the Universe. We address these two questions with new or compiled HI data for a well defined sample of ~800 galaxies isolated from major interactions. We compare with other pieces of the ISM puzzle as well as the quantification of isolation, which are being gathered within the AMIGA project (Analysing the ISM of Isolated GALaxies, <http://amiga.iaa.es>).

Author(s): D. Forbes (Swinburne University, Australia)

Title: Isolated Early-type Galaxies

Abstract: Isolated early-type galaxies are very rare, yet offer important leverage in terms of testing galaxy formation models free of environmental processes. They also act as a valuable control sample. Here I briefly summarise past samples of isolated early-type galaxies and a new well-defined sample. The morphology, stellar populations and scaling relations of these galaxies are compared to their high density counterparts.

Author(s): R. Giovanelli (Cornell University, USA)

Title: The Void Problem, Minihalos and HI

Abstract: Cosmic Voids are regions of low density, as outlined by the distribution of relatively bright galaxies. Simulations indicate that voids provide suitable environments for the survival of low mass galaxies. However, surveys do not detect as many faint galaxies as anticipated, i.e the low end of the halo mass function is steeper than the galaxy LF and voids appear to be emptier than predicted. This circumstance is often referred to as the "void problem". Perhaps low mass halos exist but are unable to retain most of their baryons, yet systems such as Leo T, with an HI mass of 2.8×10^5 solar and an indicative total mass (within its HI radius of 300 pc) of 3.3×10^6 solar do exist in the Local Group. Void environments are thought to be more benign than the near environs of giant galaxies, hence: where are the dwarves? The Arecibo ALFALFA Survey is producing a census of HI-bearing objects, for the first time over a cosmologically significant volume of the local Universe. As of early 2009, ~ 70% of the survey observations and ~ 35% of the source extraction are completed. This data base is well suited to investigate the properties of galaxies across the range of cosmic environments. ALFALFA is good at detecting small-mass, gas-rich galaxies. Preliminary results of that survey will be presented, including determinations of the HI mass function in different environments, near-neighbour statistics and an assessment of candidates for optically impaired minihalos in the low density regions of the Local Group and its immediate vicinity.

Author(s): F. Hammer (GEPI, Observatoire de Paris, France)

Title: The elaboration of field, spiral galaxies: morpho-kinematics analyses of their progenitors with IMAGES

Abstract: We are involved in a Large program (Intermediate MAss Galaxy Evolution Sequence, IMAGES) aiming at measuring the velocity fields of a representative sample of 100 massive galaxies at $z=0.4-0.75$, taken from the CDFS, the CFRS and the HDFS fields. It uses the unique mode of multiple integral field units of FLAMES/GIRAFFE at VLT. The resolved kinematics data allow to sample the large scale motions at \sim few kpc scale for each individual galaxy. They have been combined with the deepest HST/ACS, Spitzer (MIPS and IRAC) and VLT/FORS2 ever achieved observations. Most intermediate redshift galaxies show anomalous velocity fields implying that, 6 Gyrs ago, half of the present day spirals were out of equilibrium and have peculiar morphologies. The wealth of the data in these fields allows to modelize the physical processes in each galaxy with an accuracy almost similar to what is done in the local Universe. These detailed analyses reveal the importance of merger processes, including their remnant phases. Together with the large evolution of spiral properties, this points out the importance of disk survival and it strengthens the validity of the disk rebuilding scenario. This suggests that the hierarchical scenario may apply to the elaboration of disk galaxies as well as it does for ellipticals.

Author(s): G. Hensler (Inst. of Astronomy, Univ. of Vienna, Austria)

Title: Are gas-rich galaxies with ongoing star formation really isolated?

Abstract: From numerical models of the local deposit of energy released by massive stars during and up to the end of their lives we find that it is not sufficient to regulate the star-formation rate in disk galaxies on its present level over billions of years. If, in addition, hot gas outflow reduces the gas content, gas infall is requested to keep the star formation ongoing. An analytical approach demonstrates the close correlation between gas infall rate and SFR what is also already found in chemo-dynamical models of gas-rich galaxies.

Author(s): H. Hernández Toledo (UNAM, Mexico), J. A. Vázquez-Mata (UNAM, Mexico), C. Park (Seoul National University, Korea) and Y. Y. Choi (Center of Space Science and Application, Chinese Academy of Sciences, China)

Title: The UNAM-KIAS Catalog of Isolated Galaxies

Abstract: A new catalog of isolated galaxies from The Sloan Digital Sky Survey (DR5) is presented. 1522 isolated galaxies were found in 1.4 steradians of sky. The selection criteria in this so called UNAM-KIAS catalog was implemented from a variation on the criteria developed by Karachentseva 1973 including full redshift information. Through an image processing pipeline that takes advantage from the high resolution of the SDSS images a uniform g band morphological classification for all these galaxies is presented. Some representative physical properties are also presented.

Author(s): R. Herrera (Pontificia Universidad Católica de Chile, Chile), G. Galaz (Pontificia Universidad Católica de Chile, Chile)

Title: How isolated are low surface brightness galaxies? News from the SDSS

Abstract: Using the SDSS we investigate the environments where low surface brightness (LSB) galaxies are located in the universe up to redshift 0.1. We have made a careful galaxy selection, and from a sample of about 20,000 galaxies satisfying the LSB definition, we investigate the environment where they are located, and whether they are really isolated as has been claimed by several authors. We show results based on statistical tools, as the correlation function, as well as other simpler indicators of isolation, harassment or close interaction.

Author(s): A. Iovino (INAF-OA Brera, Italy) & zCosmos Team

Title: Groups vs isolated galaxies: which are the factors that shape Galaxy Evolution?

Abstract: In this talk I will discuss the role that group environment plays in shaping galaxy evolution, showing the new results obtained on this topic by the zCosmos-bright survey. zCosmos-bright survey is a purely flux limited redshift survey and targets galaxies down to $I_{ab} = 22.5$. It covers an area of ~ 0.8 sq degs and its redshift distribution extends up to $z \sim 1$. Using ~ 10000 zCosmos high quality redshifts available up to date, we were able to obtain a unique sample of groups (~ 150 with 5 or more members) and of isolated galaxies (more than 1000, selected using Voronoi tessellation in 3D). These two samples enabled us to study in a continuous way, up to $z \sim 1$, the complex interplay between environment and galaxy evolution, as revealed by galaxy colors, masses and luminosities.

Author(s): I. D. Karachentsev (SAO RAS, Russia), D. I. Makarov (SAO RAS, Russia), V. E. Karachentseva (AO Kiev Univ., Ukraine), O. V. Melnik (AO Kiev Univ., Ukraine)

Title: Properties of 500 isolated galaxies within Local Supercluster

Abstract: We introduce the first entire-sky catalog of 500 most isolated nearby galaxies with radial velocities $V_{LG} < 3500$ km/s. This kind of cosmic "orphans" amounts to 4% among all known galaxies within the same velocity range. We describe in detail a criterion of isolation applied to select our sample, "Local Orphan Galaxies" (=LOG), and discuss basic optical and HI properties of the LOGs. Then, we inspected wide surroundings of the LOGs for presence of significant neighbours according to Karachentseva (1973) criterion. The neighbours in projection (in Karachentseva's sense) were found in 60% of the cases. However, our subsequent spectral observations of the neighbouring galaxies, made with the 6-meter SAO telescope, exhibit that most of them turn out to be background objects with a median difference of radial velocities +9400 km/s regarding to the LOGs. As a result, we conclude that our sample contains about 88% true, spatially well isolated galaxies.

Author(s): V. E. Karachentseva (AO Kiev University), S. N. Mitronova (SAO RAS), O. V. Melnyk (AO Kiev University), I. D. Karachentsev (SAO RAS)

Title: The all-sky catalog of isolated galaxies selected from 2MASS

Abstract: We present a first all-sky catalog of isolated galaxies obtained via systematic automated procedure and visual inspection of extended sources from the Two Micron All-Sky Survey (2MASS). Based on Karachentseva's (1973) isolation criteria we have extracted a sample of about 4000 galaxies brighter than $K_s=12$, a half of them are very isolated. These 2MASS Very Isolated Galaxies (2MVIG) may be considered as a reference sample to study environmental effects in galaxy structure and evolution.

Author(s): B. Koribalski (ATNF, Australia) and the LVHIS Team

Title: The Local Volume HI Survey

Abstract: "The Local Volume HI Survey" (LVHIS) is a project comprising deep HI line and 20-cm radio continuum observations of a complete sample of nearby, gas-rich galaxies. Our aim is to study the HI distribution, kinematics and star formation of these galaxies individually as well as statistically, in combination with available multi-wavelength data. I will show how galaxy properties (such as diameter, star formation rate and mass-to-light ratio) behave as a function of environment, from the most isolated galaxies to the centres of galaxies groups.

Author(s): F. La Barbera (INAF-OAC, Naples - Italy), R. R. de Carvalho (INPE/DAS, Sao Jose dos Campos, SP, Brasil), I. de La Rosa (IAP, Tenerife - Spain), G. Sorrentino (INAF-OAC, Naples, Italy), R. R. Gal (IA, Hawaii - USA), J.L. Kohl-Moreira (ON, Rio de Janeiro, Brasil)

Title: On the nature of Fossil Galaxy Groups: Are they really fossils?

Abstract: We have recently defined a new sample of 25 fossil groups (FGs), defined as bound systems dominated by a single, luminous elliptical galaxy with extended X-ray emission (La Barbera et al. 2009, AJ, in press; arXiv:0812.292). For the first time, we compare the general properties of FGs (local galaxy density, distance to the red sequence, structural properties, age, metallicity, and alpha enhancement) to those of bright ellipticals in the field and in Hickson Compact Groups. Our study shows not only that FGs are very similar to 'isolated' ellipticals but also that they cannot be formed by dry mergers of ellipticals in Compact Groups. These findings suggest that FGs might not be a distinct family of true fossils, but rather the final stage of mass assembly in the Universe.

Author(s): A. López-Aguerre (Univ. La Laguna, Spain), M. Huertas-Company (ESO, Chile)

Title: ALHAMBRA morphologies: Rest-frame I-band morphologies vs. spectral type for $M > 10^5$ galaxies from $z \sim 1$

Abstract: We present the first results of a morphological analysis of galaxies in the ALHAMBRA survey. Using galSVM (<http://www.lesia.obspm.fr/~huertas/galsvm.html>) and the 23 available filters in ALHAMBRA we estimate rest-frame I-band morphologies (late-type/early-type) for a complete sample of field galaxies more massive than $M = 10^5 M_{\text{sol}}$ up to $z \sim 1$. Despite the low angular resolution, we find that the classification is reliable enough with $\sim 15\%$ of failures when calibrated with HST data. This structural morphological classification is then compared to a spectral classification based on SED fitting (BPZ). We find a good general agreement between both classifications up to $z \sim 1$. However, as stated in previous works we detect a non neglectable fraction of "blue-elliptical" galaxies. We show some ALHAMBRA low-resolution spectra of these particular objects which might be playing a key role in the migration of objects from the "blue cloud" to the "red sequence".

Author(s): A. R. López-Sánchez (CSIRO/ATNF, Australia), B. Koribalski (CSIRO/ATNF, Australia), C. Esteban (IAC, Spain), J. van Eymeren (U. Manchester, UK), A. Popping (CSIRO/ATNF, Australia) & J. Hibbard (NRAO, USA)

Title: The environment of nearby Blue Compact Dwarf Galaxies

Abstract: Blue compact dwarf galaxies (BCDGs) represent the subset of low-luminosity galaxies undergoing a strong and short-lived episode of star formation at the present time. We are obtaining deep multiwavelength data of a sample of nearby BCDGs combining broad-band optical/NIR and H α photometry, optical spectroscopy and 21-cm radio observations in order to understand their chemical and physical properties, star formation activity, kinematics, estimate the importance of the young/old stellar populations within them and the environment in which they reside. Indeed, some of the chosen BCDGs are in galaxy groups, but others are apparently isolated. In this talk, I will compare the results obtained for BCDGs both located in galaxy groups and found isolated. I will remark the evident interaction features that all of them show in their neutral gas component. This analysis strongly suggests that interactions with or between low-luminosity dwarf galaxies or HI clouds are the main trigger mechanism of the star-forming bursts in BCDGs; however these dwarf objects are only detected when deep optical images and complementary HI observations are performed. Are therefore BCDGs real isolated systems?

Author(s): G. Mamon (IAP, France / Oxford University, UK) & E. Díaz-Giménez (Córdoba, Argentina)

Title: The nature and properties of compact groups of galaxies from cosmological simulations

Abstract: Compact groups of galaxies (CGs) such as the HCGs selected by Hickson appear to have densities over 100 thousand times the critical density of the Universe. They should thus represent an extreme environment for galaxy interactions. We analyze three cosmological galaxy formation simulations to address several questions: 1) What are the biases in the HCG sample? 2) What fraction of mock CGs selected with the HCG criteria are physically dense and what fraction are chance alignments (CAs) of galaxies? 3) Ditto for the mock CGs that incorporate the biases of the HCG catalog? 4) What are the differences in the properties of dense and CA groups? 5) What galaxy formation model reproduces best the properties of the HCGs? 6) What selection criteria should be used to optimally select dense CGs?

Author(s): M. A. Martínez (Universidad de Zaragoza, Spain), A. del Olmo (IAA-CSIC, Spain), R. Coziol (Universidad de Guanajuato, México), P. Focardi (Università di Bologna, Italy), J. Perea (IAACSIC, Spain)

Title: Relationship between AGNs and Environment. AGN Population in Compact Groups

Abstract: In this work we present a clear relation between the type of nuclear activity in galaxies and their environment. We have carried out a large survey to determine the frequency and the nature of the nuclear activity in two samples of Compact Groups of galaxies (CGs): the Hickson Compact Groups (HCGs) and the Updated Zwicky Catalog of CGs (UZC-CG). To perform this study we have built a sample of 270 galaxies belonging to 64 HCGs, 200 of them we obtained new spectroscopic data using four different telescopes and the 70 remaining ones from spectra in the literature. For the UZC-CG sample, we have collected spectra from three spectroscopic archives: the Sloan Digital Sky Survey (SDSS-DR4), the Z-Machine and the FAST Spectrograph Archives. We have found spectra for all the galaxy members of 215 groups (720 galaxies). We report a extremely low fraction of Broad Line AGNs (BLAGN) to Narrow Line AGNs (NLAGN) compared to other surveys and environments: 3% in HCGs and 6% in the UZC-CG versus 22% in Ho et al(1997) sample or 43% in the Hao et al.(2005) SDSS sample. Also notably low is the ratio of Seyfert 1 to Seyfert 2, 8% in the HCGs and 19% in UZCCGs, compared to 61% measured in other environments. This appears as a real deficiency of BLAGNs in CGs, since there is no such total deficit of AGNs in CGs (at least 65% of the emission line galaxies host an AGN). Also we note that the lack of BLAGNs is not induced by differences neither in observations or analysis methods, nor due to a difference in galaxy morphology. According to the unification model, it is not expected to find different types of AGNs in different environments but in spite of the high frequency of active galaxies encountered in these groups we have found a remarkable deficiency of BLAGNs compared to NLAGNs. The cause of such deficiency may be related to the environment typical of compact groups. In CGs, galaxies are suffering slow galaxy encounters and morphological transformations and these combined effects could result in an important decrease of the amount of gas that can reach the nucleus to form the Broad Line Regions in AGNs.

Author(s): P. Di Matteo (GEPI, Observatoire de Paris, France) F. Combes (LERMA, Observatoire de Paris, France) A. L. Melchior (LERMA, Observatoire de Paris, France) B. Semelin (LERMA, Observatoire de Paris, France) M. Lehnert (GEPI, Observatoire de Paris, France) Y. Qu (GEPI, Observatoire de Paris, France)

Title: Comparing star formation activity in isolated and interacting galaxies: a numerical study

Abstract: In this talk, I will discuss the role that environment plays in affecting gas distribution and star formation in galaxies. To this aim, I will compare N-body simulations of three different samples of galaxies: isolated, one-to-one interactions, and groups, discussing the role that internal mechanisms and/or tidal effects have in determining their star formation evolution.

Author(s): A. McConnachie (Herzberg Institute of Astrophysics, NRC, Canada), L. Simard (Herzberg Institute of Astrophysics, NRC, Canada), S. Ellison (Department of Physics and Astronomy, University of Victoria, Canada) and D. Patton (Trent University, Canada)

Title: Compact groups in theory and practice: a large statistical study of the influence of close interactions on galaxy colour and morphology

Abstract: We are using the largest publicly available catalogue of compact groups of galaxies (McConnachie et al. 2009; approximately 74000 groups identified in the SDSS DR6) to provide a statistically-powerful platform from which to probe the effect of galaxy interactions on all aspects of galaxy evolution. Here, we analyse their structures using the GIM2D algorithm and compare to a carefully constructed control sample of non-group galaxies to determine the effect of the group environment - particularly galaxy-galaxy interactions - on galaxy colour and morphology. In addition, we compare our results to properties of galaxies in groups from a mock catalogue based on the Millenium simulation, allowing us to robustly understand the influence of interlopers on our observational catalogues.

Author(s): J. Pérez (IAFE - FCAG, UNLP - CONICET, Argentina), P. Tissera (IAFE - FCAG, UNLP - CONICET, Argentina), N. Padilla (Departamento de Astronomía y Astrofísica, PUC, Chile), M. S. Alonso (CONICET - Complejo Astronómico El Leoncito, Argentina) D. G. Lambas (CONICET - Observatorio Astronómico de la Universidad Nacional de Córdoba, Argentina)

Title: Environmental effects vs. galaxy interactions

Abstract: Many authors have studied the dependence of galaxy properties on environment in order to understand which mechanisms operate in the galaxy evolution. Recently, most of them have proposed that intermediate densities (e.g. galaxy groups in the outskirts of clusters, infall populations) are sites where local environment influences the transition of galaxies onto the red-sequence, as opposed to mechanisms that operate on cluster scales (e.g. ram-pressure stripping, harassment, starvation). Based on the evidence that interacting and merging systems are privileged found at intermediate densities, we use the SDSS-DR4 data to analyse the role of mergers and close galaxy interactions as environmental processes to lead evolutionary transformations. We explore the properties of galaxy pairs and merging systems at different local and global density environments, comparing them with those of isolated galaxies in an unbiased control sample.

Author(s): D. Pfenniger (Geneva Observatory, University of Geneva, Switzerland)

Title: Mass and energy budgets and galaxy evolution

Abstract: Today's understanding of galaxies has been profoundly changed by a wealth of observational data, without seeing a matching development of theoretical tools unifying the accumulated facts by common concepts. Here we will review these facts and explain in simple terms the arguments for revising the classical approach for describing galaxies as exposed in textbooks. In particular it will be shown why galaxies must be seen as essentially dissipative and evolutive structures.

Author(s): E. Platen (Kapteyn Astronomical Institute, The Netherlands)

Title: Identification of Voids & Void Galaxies from the Sloan Digital Sky Survey

Abstract: The large depth and sky coverage of the SDSS galaxy redshift distribution make it possible to reconstruct the cosmological density field with very high accuracy. The reconstructed density field together with a newly developed Cosmic Web Finding procedure allows us to identify the environmental properties of the Large Scale Structure. This method uses the Watershed Transform to classify the filaments, walls and voids in a self-consistent way (Platen et al. 2007 & Aragon et al. 2008). Using this environmental description we were able to identify the Void galaxies in the local Sloan galaxy sample. These void galaxies represent probably the most extremely isolated galaxies in the Universe. As such they pose a unique opportunity to study the process galaxy formation in deep isolation. This sample is being used to carry out various follow-up observations (see Stanonik et al.'s poster).

Author(s): S. A. Pustilnik (Special Astrophysical Observatory RAS, Russia), A. L. Tepliakova (Special Astrophysical Observatory RAS, Russia), J. M. Martin (Observatoire de Paris, Meudon, France)

Title: Study properties of dwarf galaxies in and around the nearby Lynx-Cancer void

Abstract: Study properties of dwarf galaxies in large distant voids, and especially understanding their evolutionary status, is difficult due to their faint magnitudes and small angular sizes. We use the advantage of a nearby, with $D(\text{center})$ of 13 Mpc, rather small Lynx-Cancer void, in which one can study several tens dwarfs with absolute magnitudes down to M_B of -12.5. In particular, in this void we found several very metal-poor galaxies, including DDO 68 and HS 0822+3542 with $12+\log(O/H)=7.14$ and 7.44, respectively. Taking the control sample in the void neighbourhood denser environment, we perform spectroscopy, photometry and HI observations to examine the evolutionary parameters of both samples. These include gas metallicity (O/H), gas-mass fraction, and ages of the oldest visible stellar population (via SDSS colours of galaxy outer parts). We use these data to check whether there are some systematic differences in the evolutionary parameters between two groups of dwarf galaxies. We also examine the spatial distribution of gas-rich dwarfs in the void, and in particular, whether they form coherent aggregates (filaments, pairs, groups). Our preliminary results indicate that a sizable fraction of void galaxies show evidences of slower evolution and/or retarded epoch of the first SF episode.

Author(s): J. Sabater (IAA-CSIC, Spain), L. Verdes-Montenegro (IAA-CSIC, Spain), S. Leon (IRAM, Spain), U. Lisenfeld (Univ. Granada, Spain), J. Sulentic (IAA-CSIC, Spain) and S. Verley (UNAM, Mexico / IAA-CSIC, Spain)

Title: Nuclear activity in isolated galaxies

Abstract: The project AMIGA (Analysis of the interstellar Medium of Isolated GALaxies) provides a statistically significant sample of the most isolated galaxies in the northern sky. Such a control sample is necessary to understand the role of the environment in evolution and galaxy properties like the interstellar medium (ISM), star formation and nuclear activity. The data is publicly released under a VO interface at <http://amiga.iaa.es/>. One of our main goals is the study of nuclear activity in noninteracting galaxies using different methods. We focus on the well known radiocontinuum-far infrared (FIR) correlation in order to find radio-excess galaxies which are candidates to host an active galactic nucleus (AGN) and FIR colours to find obscured AGN candidates. We looked for the existing information on nuclear activity in the Véron-Cetty catalogue and in the NASA Extragalactic Database (NED). We also used the nuclear spectra from the Sloan Digital Sky Survey which allow us to determine the possible presence of an AGN and to study the properties of the underlying stellar populations. We produced a final catalogue of AGN-candidate galaxies which will provide a baseline for the study of the nuclear activity depending on the environment. We find that the fraction of FIR selected AGN-candidates ranges between 7% and 20%. We have derived a fraction of less than 1% of radio-excess galaxies in our sample which is one of the lower rates found in comparison with other samples. Finally, we obtained a fraction of about 40% of AGN plus transition objects with the optical spectra for. We conclude that the environment plays a crucial and direct role in triggering radio nuclear activity and not only via the density-morphology relation.

Author(s): J. D. Santander-Vela (IAA-CSIC, Spain), S. Verley (IAA-CSIC, Spain)

Title: Recovering isolated galaxies and properties from large scale surveys: problems and strategies

Abstract: The large survey programs being performed, like SDSS-I to SDSS-III, and the future continuous surveying instruments, like the LSST, provide us with morphological parameters which allow for extraction of large galaxy samples. This talk addresses the problems encountered while trying to perform such an analysis on the SDSS, and the strategies needed in order to avoid them.

Author(s): P. Serra (ASTRON, The Netherlands)

Title: Galaxies in isolation: an HI perspective

Abstract: In this talk I would like to highlight a number of results and future prospects in the study of HI in galaxies as a function of environment. We are observing with the WSRT the large, complete Atlas3D sample of early-type galaxies (ETGs) in HI. This contains 260 galaxies within 42 Mpc from us, including Virgo. A careful characterization of the environment within the sample allows us to study how the HI content and properties of ETGs are affected not only by their (not) being in a cluster (in this case, Virgo), but also how small group differ from truly isolated objects. The multi-wavelength nature of this project, including SAURON integral-field spectroscopy of the whole sample, CO observation and optical imaging, makes this dataset ideal to study the nature of isolated galaxies relative to that of objects residing in groups and cluster, and the role of physical processes (e.g., cold gas accretion) that depends strongly on environment. I will also report on the serendipitous discovery of an isolated HI-rich, star-forming dwarf galaxy with very low surface brightness and whose nearest catalogued neighbour lies more than 1 Mpc from it. This galaxy is an exceptional case of a galaxy forming at $z \sim 0$ in extreme isolation. Finally, I will highlight the importance of large-field-of-view radio SKA pathfinder (e.g., ASKAP, APERTIF) to carry out all-sky surveys and characterize HI and star-formation properties of galaxies as a function of environment over the coming few years.

Author(s): R. Smith (Cardiff University, UK)

Title: The formation of isolated elliptical galaxies

Abstract: The available, weak, evidence at the moment suggests that elliptical galaxies form from merging, regardless of their environment. However, merging processes occur primarily in regions of high galactic density and so the question remains as to why isolated elliptical galaxies exist at all. One possibility is that these objects are not truly isolated but are somewhat similar to the brighter fossil groups, where the ellipticals were originally members of poor groups and have since merged with the brighter members. They should therefore now be surrounded by a halo of faint group members and have a large mass, similar to that of poor groups. We present here the initial results of an imaging and spectroscopic study of a well defined sample of isolated elliptical galaxies to investigate their masses and environment.

Author(s): A. M. Soltan (Nicolaus Copernicus Astronomical Center, Warsaw, Poland)

Title: Intergalactic matter around isolated galaxies

Abstract: Gravitational potential of individual galaxies generates inflow of primordial intergalactic matter. Due to the interaction of the in-falling gas with galactic winds, galaxies are surrounded with halos of moderately hot and dense plasma known as Warm-Hot Intergalactic Medium (WHIM). Hydrodynamic simulations indicate that the WHIM halos emit soft X-rays. In the present work, the diffuse X-ray emission in the vicinity of isolated galaxies is investigated using a large sample of the Chandra X-ray Observatory exposures. High angular resolution of the Chandra telescope allows us to examine for the first time the radial distribution of the emission within a halo, as well as to analyze the WHIM cosmic evolution up to redshift of ~ 0.4 .

Author(s): O. Spector (Tel-Aviv University, Israel), N. Brosch (Tel-Aviv University, Israel)

Title: A Simple Isolation Criterion, Based on Redshift Space Mapping

Abstract: Recent progress in redshift surveys and publicly available databases are unveiling features of the local Universe, and filling-in its redshift space map. We selected a sample of galaxies that are extremely isolated in redshift space based on data from NED, SDSS, and the ongoing ALFALFA HI (21cm) survey. A simple selection criterion was employed: having no neighbors closer than 300 km/s in redshift space. The selections and the resulting sample will be described. An analysis is being performed to estimate the actual degree of isolation and lack of environmental influence on galaxies selected by this criterion; its results will be reported.

Author(s): J. Sulentic (IAA-CSIC, Spain)

Title: Isolated Galaxies: History of Research and Ideas Over the Past 40+ Years

Abstract: We review the history of isolated galaxy research beginning with the publication of the Karachentseva CIG catalog in 1972. Initial results and subsequent multiwavelength studies are discussed. Outstanding questions are summarized in the light of the growing interest in the use of isolated samples for environmental studies. We emphasize work involving significant samples of isolated galaxies culminating with the refinement of the CIG in the AMIGA program.

Author(s): C. Theis (Inst. of Astronomy, Univ. Vienna, Austria), J. Koeppen (Observatoire de Strasbourg, France)

Title: Starbursts in isolated galaxies

Abstract: Starbursts and substantial variations in the star formation histories are a common phenomenon in galaxies. Although predominantly found in interacting galaxies, they occur also in isolated galaxies. We study the stability properties of isolated star forming dwarf galaxies with the aim of identifying starburst modes. We investigate the impact of the stellar birth function, i.e. both, a spontaneous and an induced star formation mode, the impact of the initial mass function (IMF), the stellar feedback and the interstellar medium (ISM) model on the galactic star formation history. Especially we focus on dynamically driven starbursts induced by stellar feedback. In order to scan through these complex processes, we apply a one-zone model for a star-gas system coupled by both mass and energy transfer. Additionally, we extend the model for active dynamical evolution. This allows for a coupling between the dynamical state of the galaxy and its internal properties like star formation activity or the thermal state of the ISM. While the influence of the dynamics on the total star formation rate is strong, especially with non-linear stellar birth functions, the coupling of the internal properties (gas temperature) on the dynamics is rather limited. Due to efficient self-regulation the star formation rate is close to the equilibrium star formation rates. Quasi-periodic starbursts occur, because star formation follows the variations in the gas density induced by decaying virial oscillations. This behaviour is quite insensitive to the nature and the details of the stellar birth description, i.e. whether spontaneous or induced star formation is considered or the IMF is varied.

Author(s): J. Tinker (University of California, Berkeley, USA)

Title: On the Emptiness of Voids: There is No Voids Problem

Abstract: I will show that, if the processes which govern galaxy formation are independent of largescale environment, the size and depth of voids are in excellent agreement with observational data for galaxies as faint as 8 magnitudes below L^* . Further, I will demonstrate that the colors of galaxies hosted by halos of fixed mass are independent of environment as well: the color-density relation is entirely determined by the change of the halo mass function with density. This implies that galaxy formation history and halo formation history are nearly decoupled.

Author(s): P. Tissera (IAFE, Conicet-UBA, Argentina)

Title: Main successes and failures of current galaxy formation models

Abstract: During the past few years, we have been witness of a steady progress in the determination of galaxy properties from the local to the high redshift Universe. The ever-growing accurate data need to be put together in a coherent picture in order to gain insight on how galaxy formation proceeds in different environments. Models and simulations are a key tool for this purpose. I will discuss some of the open questions and main successes achieved by current galaxy formation models.

Author(s): M.C. Toribio (Universitat de Barcelona, Spain) on behalf of the ALFALFA collaboration

Title: Neutral hydrogen content of galaxies in low density regions from the ALFALFA survey

Abstract: Neutral hydrogen (HI) observations from the on-going Arecibo Legacy Fast ALFA (ALFALFA) blind extragalactic HI survey are used to define new standards for the HI content of galaxies. The reference sample is comprised of galaxies which are located in regions of high isolation. Three-dimensional local densities of ALFALFA's HI sources have been estimated from the spatial distribution of galaxies inferred from the Sloan Digital Sky Survey (SDSS) spectroscopic data on those areas of the sky where both catalogs overlap. In order to identify the combination of intrinsic properties that predicts more accurately the HI content of a galaxy, we apply a Principal Component Analysis technique that corrects biases arising from censored data and observational errors. The results of this work set up a suitable framework for the investigation of the atomic hydrogen content of galaxies in differing intergalactic environments of the local universe.

Author(s): G. Trinchieri (INAF - Osservatorio Astronomico di Brera, Italy), E. Memola (INAF-OABrera, Milano, Italy), A. Wolter (INAF-OABrera, Milano, Italy), P. Focardi (Univ. Bologna, Italy), B. Kelm (Univ. di Bologna, Italy)

Title: Diverse X-ray properties of truly isolated elliptical galaxies

Abstract: In spite of careful selection of very homogeneous objects, both in terms of optical properties and environmental characteristics, the range in X-ray luminosities and LX /LB ratios is still quite large, with objects showing a hot gaseous halo, and others where no gas is detected to a factor > 10 in luminosity. Again, optical properties are not clear diagnostics to predict the X-ray luminosity in elliptical galaxies, Younger objects tend to be less luminous in X-rays relative to older systems, however it appears that older objects could span a wide range in luminosities.

Author(s): B. Tully, (University of Hawaii, USA)

Title: Lonely Galaxies in the Local Void

Abstract: The Local Void is impressively big but it is not entirely empty. It is laced with wispy filaments. A half dozen galaxies lie within the void and within 15 Mpc of us. One has an accurate TRGB distance and is found to have a high velocity away from the void center.

Author(s): S. Verley (UNAM, Mexico / IAA-CSIC, Spain)

Title: AMIGA project: Quantification of the isolation of 950 CIG galaxies

Abstract: The role of the environment on galaxy evolution is still not fully understood. In order to quantify and set limits on the role of nurture one must identify and study a sample of isolated galaxies. The AMIGA project "Analysis of the Interstellar Medium of Isolated GALaxies" is doing a multiwavelength study of a large sample of isolated galaxies in order to examine their interstellar medium and star formation activity. We processed 950 galaxies from the Catalogue of Isolated Galaxies (CIG, Karachentseva 1973) and evaluated their isolation using an automated star-galaxy classification procedure (down to MB ~ 17.5) on large digitised POSS-I fields surrounding each isolated galaxy (within a projected radius of at least 0.5 Mpc). We defined, compared and discussed various criteria to quantify the degree of isolation for these galaxies: e.g. Karachentseva's revised criterion, local surface density computations, estimation of the external tidal force affecting each isolated galaxy. We find galaxies violating Karachentseva's original criterion, and we define various subsamples of galaxies according to their degree of isolation. Additionally, we sought for the redshifts of the primary and companion galaxies to access the radial dimension. We also applied our pipeline to triplets, compact groups and clusters and interpret the isolated galaxy population in light of these control samples.

Author(s): R. van de Weygaert (Kapteyn Astronomical Institute, University of Groningen, The Netherlands)

Title: A Hierarchy of Voids: the evolution and dynamics of voids

Abstract: Voids are an integral component of the Cosmic Web. They are important probes for testing cosmology and structure formation scenarios and have become particularly important as testing ground for the formation of galaxies and related environmental influences. Voids evolve hierarchically, marked by the two processes of "void merging" and "void collapse". It results in a self-similar, volume-filling population of voids with a peaked size distribution. I will first discuss our local extended Press-Schechter description of hierarchical void evolution. Subsequently, I will show that voids are very sensitive to the large-scale matter distribution: the same tidal forces that shape the filamentary morphology of the Cosmic Web predict the nonspherical shape distribution of voids and their alignment over distances larger than $30 h^{-1}$ mpc. Finally, this allows us to develop the nonlocal void patch description within the context of the Cosmic Web theory. It provides an extensive framework for the description and analysis of the dynamics, structure and substructure of voids in any cosmological cosmic structure formation scenario.

Author(s): E. Wilcots (University of Wisconsin-Madison, USA)

Title: Asymmetry and Lopsidedness: Nature or Nurture?

Abstract: While it has long been thought that galaxy-galaxy interactions were the primary cause of asymmetry, a suite of recent studies provide compelling evidence that asymmetry is the result of nature rather than nurture. A key factor may be the ongoing accretion of baryons that is part of the process of galaxy formation. This talk will look at the level of asymmetry in isolated and binary galaxies and address the question of the extent to which ongoing accretion can affect the morphology of otherwise isolated galaxies.

Author(s): M. S. Yun (University of Massachusetts, USA)

Title: Reflection and future perspective from the observational side

Abstract: I will highlight some of the intriguing recent observational results on the study of the impact of environment on galaxy properties and anticipate new insights from the upcoming observational programs and facilities. It will be a highly biased personal view on the topic, and active participation by the audience is fully expected.

Author(s): B. Ziegler (ESO, Germany), C. Da Rocha (ESO, Germany), A. Boehm (AIP, Germany), E. Kutdemir (Kapteyn, the Netherlands), W. Kapferer (Univ. Innsbruck, Austria)

Title: Evolution of structure and kinematics of field galaxies out to $z=1$ compared to cluster galaxies

Abstract: We quantitatively investigate the evolution in kinematics, structure and stellar populations of isolated spiral galaxies out to $z=1$ comparing them both to pairs (in the field) and to cluster members. Many ESO campaigns of optical spectroscopy with FORS2@VLT allowed us to derive rotation curves for 150 (out of 250) field spirals and 40 cluster members and 2dim. velocity fields for 80 field & cluster galaxies, which we combine with a structural analysis using our HST/ACS images and a stellar population study based on spectral lines and multicolor photometry. We find for example no difference in the Tully-Fisher relation between field and pair galaxies. To assess possible interaction mechanisms for cluster members we directly compare observations with N-body/SPH simulations of different processes.