Poster 1

The discovery of a ring of star formation in the infrared luminous galaxy NGC1614

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ABSTRACT

We present *HST*/NICMOS and ground-based observations of the infrared luminous merger galaxy NGC 1614. The line emission Paα image ($\lambda_{\rm rest} = 1.87\,\mu$m) reveals for the first time a ring of star formation with an approximate diameter of 600 pc. The morphology of this ring is remarkably similar to that seen at 6 cm and at lower resolution, in the mid-infrared, suggesting that both the radio and the mid-infrared emissions are the result of a strong episode of star formation. Despite the presence, on the large scales, of tidal tails suggestive of an interaction, the high resolution continuum NICMOS images show no evidence for the presence of a double nucleus within the central 1 kpc of this galaxy. This is suggestive of an interaction bewteen a rich-gas galaxy and a small, possibly irregular, galaxy which only disrupted the outer parts of the gas rich galaxy. The lack of a hidden AGN, the relatively blue $H-K$ nuclear color and the low extinction point to NGC 1614 as a counterexample for the scenario in which infrared luminous and ultraluminous galaxies are the initial stage for the appearance of a quasar. The star formation properties of this galaxy are discussed in the context of the different mechanisms invoked to explain the high luminosity of infrared luminous galaxies.

Poster 2

The orientation of extragalactic radiosources relatively to their parent elliptical galaxies

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ABSTRACT

The relative orientation of radio axes and optical axes of radiogalaxies has been analysed for a sample of 272 sources. Radio axes are found correlated with optical minor axes of the host galaxy for the more elongated radiosources ($K > 2.5$, where K is the ratio of major to minor radio axes) and for FRII type radiogalaxies, while they appear correlated with optical major axes for the less elongated ($K < 2.5$) and FRI type radiogalaxies. In both cases the correlation is more significant for the classification of radiosources by their elongation, than for the Fanaroff-Riley classification. This classification by elongation, therefore appears quite interesting for our under- standing of global properties and formation of extragalactic radiosources. An alternative formation scenario, which propo- ses that they are generated by the sporadic ejection of plasma from a central core into a large dipolar galactic magnetic field, can for instance provide some theoretical grounds to such a classification.

Poster 3

The color-magnitude and color Tully-Fisher relations of disk galaxies

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ABSTRACT

We propose and show that the dependence of the dust absorption upon B-band luminosity reported by Wang & Heckman (1996) for a sample of late-type galaxies may explain the observed color-magnitude and color Tully-Fisher (TF) relations of disk galaxies. We present models of galaxy evolution within a hierarchical formation scenario where the star formation efficiency does not sustantially depend upon mass. After applying to these models the Wang & Heckman's luminosity-dependent extinction, we predict the observed TF relations in the H and B bands as well as the color-magnitude relation. We discuss why the dust extinction might depend on the galaxy mass.

Poster 4

HI and CO mapping of two anemic galaxies in the Virgo cluster

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ABSTRACT

The Virgo cluster is an ideal laboratory to study the influence of the environment on galaxies. Two anemic galaxies, NGC 4548 and NGC 4579 have been observed in the 21-cm line at the VLA and in CO at IRAM. We analyse their kinematics and their star formation. NGC 4548 presents a perturbed HI arm likely due to ram pressure according to the comparison with a dynamical model. The major difference between these two galaxies is their HI to CO ratio which we try to explain by the different galaxy trajectories within the cluster. Further modelisation and observations of other Virgo spirals are in progress.

Poster 5

Photometric Properties of Low Redshift Galaxy Clusters

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ABSTRACT

The advent of large format mosaic CCD cameras has given us the unprecedented ability to efficiently sample the galaxy population in low redshift galaxy clusters. We are presently

conducting a photometric study of galaxy clusters in the redshift range of $0.02 - 0.04$ with the 8k CCD mosaic camera on the KPNO 0.9m telescope. This telescope/detector combination, with a pixel scale of $0.42''$/pix, provides a one square degree field of view, giving an areal coverage of $1 - 2h^{-1}$ Mpc^2. These observations will allows us to determine the projected spatial distribution and luminosity function (LF) of cluster galaxies. With these data, will will test the cD formation scenario based on the disruption of dwarf galaxies (Lopez-Cruz et al. 1996 ApJ, 475, L97) by: a) measuring LF's as a function of clustercentric radius, b) determining the spatial distribution of dwarf galaxies, and c) measuring the color gradients for dwarf galaxies, and the halos of cD and BCG's. Preliminary results, such as luminosity functions, will be presented for several Abell galaxy clusters.

Poster 6

Evolution of cluster elliptical galaxies

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ABSTRACT

Elliptical galaxies define a unique and simple laboratory to study the process of galaxy formation and the evolution of stellar populations. Observational data, including a sample of eight clusters observed at Cerro Tololo Inter–American Observatory (CTIO) and ten clusters observed with the Hubble Space Telescope (HST), have been used to conduct several related studies. A surface brightness analysis of the ellipticals in the cores of ten galaxy clusters observed with HST shows that elliptical galaxies are well–represented by an $r^{1/4}$–law light profile and follow a well–defined relation in the magnitude/size plane, up to $z = 1.2$. This relation shifts, on average, towards higher luminosities (or equivalently, to smaller sizes) with increasing redshift. If we assume that the size of these galaxies are fixed during the period from $z = 1.2$ to the present, then these galaxies are evolving monotonically in luminosity. This luminosity evolution amounts to $\Delta M_B = -1.2$ at $z = 1.2$, when compared to the galaxies in local clusters, and is consistent with that expected for an old and passively evolving stellar population. The luminosity functions for the red galaxies from the eight clusters in the CTIO sample show that are well–represented by a Schechter function, consistent with a single value for their characteristic magnitude (M*). When compared to local cluster luminosity functions, there is evidence for a brightening of a few tenths of a magnitude in M* (the exact value depends on the cosmology). For a low density universe, the brightening observed in the luminosity function, up to $z = 0.45$, is consistent with that observed from the surface brightness analysis. The cluster elliptical galaxies from the CTIO sample, selected morphologically using a galaxy light profile fitting technique, define a very tight sequence in

the colour/magnitude plane. All the clusters are consistent with having a single value for their intrinsic colour dispersions, $\delta = 0.06 \pm 0.02$, in the restframe $(U-V)/V$ colour relation. These small colour dispersions imply the stars in these galaxies have a typical age dispersion from galaxy to galaxy of $\sim$20% of their age at $z = 0.45$. Similarly, when comparing the mean colour for the different clusters, it was found that they are consistent with having a single mean colour, $(V-I) = 2.055 \pm 0.028$. The small dispersion in the mean colours is completely accounted for by sampling uncertainties. With the addition of K–band photometry, and data for local ellipticals, it has been possible to determine the evolutionary vector in the restframe $(U-V)/(V-H)$ colour plane from $z = 0.45$ to $z = 0$. Predictions of current models have been tested against this observed vector. Most of the more popular models have failed to account for this colour change, and only a more sophisticated model —including infall of primordial gas and chemical enrichment during the assembly of the stellar population— was able to reproduce the observed evolution. The observations in this work strongly suggest that these galaxies are old systems formed at high redshift. However, given the quantitative uncertainties in the observations, population synthesis models, cosmology, and uncertainties in how much synchronicity in formation is reasonable, the observations do not rule out scenarios involving formation at lower redshifts.

Poster 7

Photometrical deprojection of edge-on galaxies

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ABSTRACT

Photometric parameters of stellar disks and bulges for six edge-on galaxies from the Catalog of Flat Galaxies (FGC) were determined. It is shown that galaxies of our sample which belong to 4th class of surface brightness according to FGC (dimmest galaxies) appear to be edge-on Low Surface Brightness (LSB) galaxies. In the frame of our sample LSB galaxies have more faible disks than normal, HSB galaxies. At the same time parameters of bulges of LSB and HSB galaxies don't differs too much. We present results of R CCD photometry of another one edge-on galaxy FGC 2574 obtained with the 6-m telescope at SAO (Russian Academy of Sciences). Deprojecting this galaxy we show that it has thin LSB disk (central surface brightness $22^m.2$ in R) and "normal" bulge.

Poster 8

Chemo-Spectrophotometric Evolution of Spiral Galaxies: colour and abundance gradients

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ABSTRACT

We developed recently a self-consistent model for the chemical and spectro-photometric evolution of spiral galaxies, and calibrated it on the Milky Way. Other disk galaxies are characterized by two parameters: the circular velocity V_C, and the spin parameter λ. With the hypothesis that massive galaxies formed their stars earlier than less massive ones, a (λ-V_C) grid of models matches nicely the main observed properties (Tully-Fisher relationship, Mass-metallicity relation, colour-magnitude diagrams...). The abundance gradients predicted by the models compare well with observed ones, expressed in dex/kpc, dex/R_B and dex/R_{25} (R_B: scale-length in the blue band, R_{25}: isophotal radius where the surface brightness is 25 mag arcsec^{-2}). We also underline a correlation between abundance gradients (in dex/kpc) and $1/R_B$ which is equivalent to a magnitude gradient.

Poster 9

A VLA HI Survey of Post Starburst Galaxies in Coma

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ABSTRACT

We present preliminary results of a deep survey of Post Starburst galaxies in the cluster of Coma. Forty two hours were devoted in March 1999 with the VLA in its D configuration, in order to survey the center and SW region of Coma, where several Post Starbursts have been reported, both in optical and HI. One of the main targets is the lenticular IC 3949, marginally detected in previous observations with the VLA in C configuration.

Poster 10

Multiband Analysis of a Sample of Blue Compact Dwarf Galaxies: Surface Brightness Distributions and Morphology

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ABSTRACT

Multirange broad-band obseravtions in B,V, R , I have been performed for a sample of 28 galaxies catalogued as Blue Compact Dwarf Galaxies (BCDs). Our deep imaging reaching surface brightness levels of order few percent of the sky brightness has allowed the detection of underlying emission or fainter extensions for a substantial fraction of the sample. In this contribution we present the first results derived for the program including deep contour maps in the B band, surface brightness profiles as well color profiles for all the galaxies. The information derived for this sample of galaxies has allowed us to analyse the morphology and the structural components of the BCD. Over 70% of the galaxies analysed present complex profiles, showing extra structure at intermediate to low intensity levels which preclude a fitting by a single standard law . In 23 of the 28 galaxies of the sample a low luminosity underlying disk has been detected.

Poster 11

First APM QSOs Survey (FAQS) in the SBS region

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ABSTRACT

In the area of 1000 sq.degree covered by the Second Byurakan Survey (SBS, about 350 QSOs brighter than B=19.5 were detected. The spectroscopic complete sample contains about 120 objects brighter than B=17.5. In order to detect the missed QSOs - by the SBS - we have used the deep radio (FIRST) and optical (APM) surveys. The overlapping area between

FIRST and SBS surveys is about 700 sq.degree. We have cross-identified the FIRST catalog with APM objects. With the following selection criteria: 1) Coincidence of positions of the FIRST and APM objects within a 3" radius; 2) Objects classified as stellar-like on APM; 3) APM O-magnitudes between 14.5 and 18.5. The final list of sources in this overlapping region contains 450 objects. Of which 70 objects had known spectral characteristics and had mainly been discovered by the SBS survey. During 1999, we have carried out spectroscopic observations for more than 100 FAQS objects with the 2.1m telescope of the Guillermo Haro Astrophysical Observatory. In this subsample we have found 35 new QSOs, 5 Seyferts, 15 emission line galaxies, and 45 stars.

Poster 12

Optical Monitoring Of Seyfert Galaxy And Quasar Nuclei in 1998. I . Observations

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ABSTRACT

In 1998, a few groups of astronomers from the FSU (Former Soviet Union), Europe and Mexico executed observations of the nuclei in 11 Seyfert galaxies and quasars with different telescopes for a common program of optical monitoring. The CCD spectral observations were carried out with the 6-m and 1-m telescopes of SAO RAS (Russia) and 2.1m telescope of Cananea (Mexico) in the range between 4000A and 8000A with resolution of 6-12A and a signal to noise ratio 50-100 from the continuum in the H-betta and H-alfa regions. About 500 spectra were obtained and their primary processing was performed. Spectra of objects are presented for illustration of the variations observed in them during the year and comparison of the observational data acquired with the different telescopes. The variations of emission line profiles in 1998 are investigated. The broad-band optical monitoring with UBVR filters (accurancy 1% in the R-band) was done at four observatories. The data of photometric monitoring in BVR bands with the 1m and 60cm telescopes of SAO with the use of a CCD camera in a 10 arcsec aperture are presented

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Poster 13

Oxygen and helium abundances in Galactic H II regions. Abundance gradients

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ABSTRACT

Absolute integrated fluxes have been obtained for 34 H II regions, with Galactocentric distances $R_{\rm G}$ in the 6.6–17.7 kpc range, in the emission lines [OII] 3726 and 3729, [OIII] 4363 and 5007, HeI 5876, Hα and Hβ. Data are analysed to derive the extinctions, the electron densities and temperatures, the ionic abundances O^+/H^+, O^{++}/H^+ and He^+/H^+ and the O/H abundance ratio. The electron temperature has been derived from the [OIII] 4363 / 5007 ratio in six HII regions with $R_{\rm G}$ between 6.6 kpc and 14.8 kpc. These new measurements of $T_{\rm e}$, which are in good agreement with those from radio recombination lines, widen the $R_{\rm G}$ range for which reliable $T_{\rm e}$ measurements exist. Combining our new $T_{\rm e}$(OIII) results with the radio values, we obtain the following temperature relationship: $T_{\rm e}$ [K] $= (372 \pm 38) R_{\rm G} + 4260 \pm 350$. The O^+/H^+ and O^{++}/H^+ abundances have been obtained assuming a two-temperature HII region model. Our O/H relationship for 5kpc $< R_{\rm G} <$ 15 kpc is $12 + \log {\rm O/H} = (-3.95 \pm 0.49) \times 10^{-2} R_{\rm G} + (8.82 \pm 0.05)$. The slope is lower, by a factor of two, than that previously obtained by Shaver et al. (1983). No significant flattening of this relation is obtained out to 15 kpc. At the solar Galactocentric distance, $12 + \log({\rm O/H}) = 8.48$, in good agreement with the O/H abundance measured in the local interstellar medium by Meyer et al. (1998), and a factor of two lower than the solar abundance. Our helium observations show that even a region ionized by a star earlier than O6.5 may contain a significant amount of neutral helium. We confirm the high $\Delta Y/\Delta({\rm O/H})$ value ($\geq$180) measured in the Galaxy by Peimbert et al. (1992). References Meyer D.M., Jura M., Cardelli J.A., 1998, ApJ 493, 222 Peimbert M., Torres-Peimbert S., Ruiz M.T., 1992, RMAA, 24, 155 Shaver P.A., McGee R.X., Newton L.M., Danks A.C., Pottash S.R.,1983, MNRAS 204, 53.

Poster 14

Spectroscopic and Photometric Properties of Merging Galaxies

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ABSTRACT

We describe the spectroscopic and infrared properties of a sample of 26 merging galaxies, selected from the Catalogue of Arp & Madore (1987) and we compare them with those observed in a similar sample of interacting galaxies. It is observed that mergers and interacting systems spawn a wide range of spectral types, going from those corresponding to well evolved stellar populations (older than 200 Myr) to those that show clearly signatures of HII regions with stellar populations younger than 8 Myr as show. However, merger galaxies show on average more excited spectra than interacting pairs. From the emission lines we also found that merging systems show on average higher (almost 100%) star formation rates than interacting galaxies. If interactions trigger star formation, this fact is not surprising since in mergers the interactions effects are particularly strong. Clasical diagnostic diagrams show that 6 % of the galaxies have some form of active galactic nucleus, being 2 Seyfert galaxies and 1 LINER. However, through a detailed analysis of the pure-emission line spectra we conclude that this fraction may raise up to 23 % (against 40 % in the interacting sample) if we consider that some galaxies have a low-luminosity active nucleus surrounded by strong star formation regions. This later asumption is also supported by the infrared colors of the mergers. Infrared luminosities show that only 11 % of the merging systems are Luminous Infrared Galaxies, while in the interacting sample this fraction raises to 22 %. Though the galaxy samples are relatively small, these later results may indicate that if interactions trigger nucleus activity it occurs at the early stages of the galaxy encounters.

Poster 15

Diffuse Lyα Emission from High-redshift Galaxies

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ABSTRACT

Steidel et al. (1999) observe two large, diffuse regions of Lyα emission in a cluster of galaxies at $z = 3$, with $L_{\mathrm{Ly}\alpha}$ about 10^{44} erg s^{-1}. We suggest that these diffuse regions may be powered mainly by gravitational energy and supernova energy rather than by ionization radiation from young stars. In cosmological N-body/hydrodynamical simulations, we find regions of cooling gas with similar size and luminosity around luminous galaxies. The total cooling luminosity is on average comparable to the gravitational potential energy of the baryons. However, roughly 50% of the cooling radiation emerges as Lyα from gas with $T \approx 10^4$ K, in contrast to the classical picture of gas cooling from an initial virial temperature of $T \sim 10^6$ K. Supernova feedback boosts the cooling emission by about 50%. The luminosity in the cooling radiation is usually much less than the stellar ultraviolet luminosity, except in the most massive systems. However, it is produced in a larger region and is less likely to be absorbed by dust.

Poster 16

A Ubvrijhk Catalog Of Nearby Galaxies: The Spectral Energy Distribution As A Function Of Type, Inclination And Luminosity

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ABSTRACT

The degeneracy between the star formation history, the initial mass function, the age of the first stars, the metallicity and the extinction is a serious problem for the spectral synthesis of galaxies. A large spectral range is obviously required to break this degeneracy, but till now, most studies have focused on the optical for want of comparable data at other wavelengths. In the near-infrared (NIR) especially, galaxies have been observed in small apertures not representative of the whole galaxy. To solve this problem, we have built NIR growth curves of the magnitude as a function of the aperture and used them to compute total and effective NIR magnitudes for about thousand nearby galaxies. A UBVRIJHK catalog has been produced by merging them with optical data. The comparison of effective and total optical-to-NIR colors shows a clear blue outwards gradient, in particular for intermediate spirals, indicating a younger age or a lower metallicity than what would be derived from central colors. A statistical analysis of this catalog allows us: 1. to define standard optical-to-NIR and NIR colors for each morphological type, 2. to establish color-magnitude relations 3. and to study the reddening of the colors with increasing inclination due to the optical depth. We derive U to K consistent integrated "spectral" energy distributions (SED) which should prove to be very useful templates to constrain the star formation history and the age of galaxies. We finally compare them to predictions of the new version of the PEGASE model of spectral evolution, which takes into account the metallicity of stellar populations and the effect of the dust on the SED through a simple radiative transfer code.

Poster 17

Kinematics and Dynamics of the Isolated Interacting Galaxy Pair NGC 5426/27 (Arp 271)

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ABSTRACT

The isolated interacting galaxy pair NGC 5426/27 (Arp 271) was observed with the scanning Fabry-Perot interferometer PUMA. From these observations we derived for each galaxy: its velocity field, various kinematical parameters and its rotation curve. These we reanalyzed individually as well as in the context of the interaction. We found a small bar-like structure in NGC 5426 which is probably due to the interaction and also, a severely distorted velocity field for NGC 5427. A range of possible masses was computed for each of the galaxies. Finally, we studied the type and the stage of the interaction and the effects it has had on each of the components of the pair. Though this pair seems to be suffering a weak interaction, there is a bridge of material between the two galaxies and large distortions from the "typical" spiral structure in NGC 5427.

Poster 18

Lyα Emission from QSO absorbers at high redshifts

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ABSTRACT

We present new results from narrow band Lyα imaging of Damped Lyα absorbers and Lyman Limit systems at high redshift. Furthermore, we discuss the relation between galaxies selected from HI column density, Lyα narrow band imaging and the Lyman Break technique.

Poster 19

NIR 2D images of a selected sample of nearby spiral galaxies

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ABSTRACT

Using the IAC NIR Nicmos Camera, CAIN, with the recently upgraded wide field cold optics, we have started a project aimed at mapping a flux limited sample of nearby grand design spiral galaxies selected according to their brightness and inclination. In this poster we present the first results which include NGC 3359, NGC 6384 and NGC 7479. The NIR colors distribution on the projected plane of the galaxy is discussed along with a estimation of the internal extinction in the object. Comparison with optical images of similar or better spatial resolution is also presented which would permit the underlying of the distribution of the stellar population.

Poster 20

How dust affect the temperature profile of the Orion Nebula

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ABSTRACT

New observations of the Orion nebula are presented. These were taken at the OAGH (Observatorio Astrofsico Guillermo Haro) using a B & C with a 1034x1024 TEK CCD. The spectrum covers the range 3600-9600 Angstroms. Using the line ratio temperature indicator [OIII] 4363/5007, we have determined the spatial distribution of the electronic temperature (Te) across the nebula. We observe a significant increase of Te towards the exciting star. This is the reverse of what standard photoionization models predict in which hardening of the ionizing radiation (with distance) ought to produce an outward positive gradient in Te. We present photoionization calculations which include internal dust mixed with the ionized gas. We alco consider an outward negative density gradient as an alternative explanation. Both approaches can reproduce a flat behaviour of Te with position but only models with decreasing density are able to reproduce the apparent spike in NII 5755 near the exciting star.

Poster 21

The Effect of bar on star formation in normal galaxies

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ABSTRACT

We pick out all Sa to Sd galaxies with B_T^0 from RC3, after removing all known AGNs and interacting galaxies, we found that: (1) when using FIR/B as an indicator of star formation for normal spiral galaxies, we must correct FIR for cirrus emission which is the function of Hubble type , confirming the results by Sauvage & Thuan (1992); (2) the bar's effect on star formation depends on the star formation level of the sample, and we confirm that in early-type galaxies (from Sa to Sb), bar enhances star formation, and in Sbc type, bar seems no effect on star formation; and in Scd and Sd galaxies, barred galaxies are less luminous than unbarred ones.

Poster 22

Galaxy Associations in Galaxy Clusters

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ABSTRACT

The results of the analysis of the subclustering in a sample of ESO Key Program on Nearby Abell Cluster Survey (ENACS) galaxy clusters, as well as of other clusters will be presented. The analysis is performed by using the S-tree method enabling one to study the hierarchical properties of clusters, namely by the detection of the main physical cluster and of its subgroups. The results indicate: (a) systematically lower genuine cluster velocity dispersions than known from previous studies; (b) existence of 2-3 galaxy subgroups in each cluster. Due to certain properties of specific dynamical entities, we denote these subgroups as *galaxy associations* (Gurzadyan, Mazure, MN,295,177,1998), which can become an essential challenge for formation and evolutionary mechanisms in galaxy clusters. Anomaleous star forming activity is predicted for the galaxies in galaxy associations.

Poster 23

Large-Scale Star Formation and Asymmetric Morphology in Arp 119: Infrared Observations and Numerical Simulations

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ABSTRACT

The collision of a gas-rich disk galaxy with another galaxy causes significant changes in the structure of the gas disk. Density enhancements in the form of long arcs and rings can lead to discrete, kiloparsec-sized condensations in the gas and subsequent star formation on these same scales. The southern member of the interacting galaxy pair Arp 119 displays an extremely asymmetric morphology and evidence of recent starburst episodes. This galaxy features a nucleus displaced to the northwest and encompassed by a blue ring, a bright arc extending to the northwest having significant B-band emission, an arc of isolated knots along the southern edge, and only wispy, low-luminosity material filling the eastern half of the galaxy. We have a series of computer simulations involving the collision of a gas-rich disk galaxy and a gas-free elliptical. One of these simulations yields a strongly-disturbed disk galaxy having features in common with the southern member of Arp 119. By comparing this simulation with our near-infrared observations of Arp 119 (along with published data taken at other wavelengths), we conclude that many of the pecular features observed in the southern member can be understood using the model of a disk-elliptical collision in which the elliptical is similar to the northern member of Arp 119. The simulation and observations can be used to gain information about the progression and timing of star formation episodes in Arp 119.

Poster 24

Constraining the primordial IMF through present day limits on population III objects

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ABSTRACT

Within the framework of the standard cold dark matter scenario the first baryonic structures to cool appear at z 30. Assuming the angular momentum of these systems fixes their initial structure to be that of a disk at the centre of their dark matter halos, we use the predicted cooling temperature of the baryonic material to calculate the initial gravitational fragmentation of these disks through a Toomre criterion. The fraction of gas turned into stars in these proto-galactic structures as a function of the initial angular momentum and temperature is used to estimate the number of popII stars formed, as a function of the primordial IMF. The abundance and incorporation of these primordial structures into larger objects is treated within a cosmological framework through a Press-Shechter approach. Comparison with current limits on the numbers of these stars then provides some constraints on the primordial IMF.

Poster 25

Statistical Properties of the Emission in Mixed Morphology Pairs: FIR Results

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ABSTRACT

We examine the level of MIR/FIR enhancement that can be stimulated by galaxy-galaxy interactions and its correlation to optical morphology. It extends over the optical results in Hernández Toledo et al. (1999, Hereafter Paper1) into the FIR which is more sensitive to the signature of interaction induced star formation by making use of one of the most complete and homogeneous optically-selected samples of (E+S) pairs (Catalogue of Isolated Pairs of Galaxies in the Northern Hemisphere; hereafter CPG: Karachentsev 1972). This pair sample has the advantage of having a similarly compiled control sample (Catalogue of Isolated Galaxies: hereafter CIG: Karachentseva 1973) over the same region of the northern sky as the (E+S) pairs. The size and depth of both the (E+S) and CIG samples make it possible to study the correlation of MIR and FIR emission with several other optical properties including the component/pair morphologies and a new estimation of the FIR luminosity function (FIRLF). We find average factors of 3 and 5 enhancement in FIR and 25μm luminosities of the late-type pair components relative to an isolated galaxy control sample. This is interpreted as the MIR/FIR signature of the interaction–star formation connection. The large number of E+S pairs, the presence of both an optical luminosity enhancement (Paper 1), the clear FIR enhancement reported here and varying degrees of morphological distortion suggest that most of these pairs are physical binaries. A question then emergess: How mixed pairs can exist at all in significant numbers when local environmental conditions are thought to dictate galaxy morphology?

Poster 26

Star Formation in the Galaxy and the Fluctuating UV Radiation Field

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ABSTRACT

We examine the formation of massive stars in the Galaxy, the resultant fluctuating UV radiation field, and the effect of this field on the star-forming interstellar medium. Following previous researchers such as Habing (1968), we calculate the average interstellar radiation field at the Solar Circle of the Galaxy. However, our new calculations follow more closely the time dependence of the field at any point. We show that there is a significant difference between the mean field and the median field, and that there are substantial fluctuations of the field (on timescales of order 100 million years) at a given point. Far Ultraviolet Radiation (FUV, $6ev < h\nu < 13.6ev$) has been recognized as the main source of heating of the neutral interstellar gas. Given the pressure of the interstellar medium (ISM) the FUV field determines whether the thermal balance of the neutral gas results in cold ($T \sim 50-100K$) clouds (CNM), warm ($T \sim 10^4K$) (WNM), or a combination of the two (the two phase ISM). We present results for the time hystory of the FUV field for points in the local ISM of the Milky Way Galaxy. The presence of this fluctuating heating rate converts CNM to WNM and vice versa. We show how to calculate the average fractions of the gas in the CNM and WNM when the interstellar gas is subject to this fluctuating FUV field. The knowledge of how these fractions dependon the gas properties (i.e. mean density and composition) and on the FUV-sources (i.e. the star formation rate, or the IMF, or the size distribution of associations) is a basic step in building any detailed model of the large scale behavior of the ISM and the mutual relation between the ISM and the SFR.

Poster 27

MicroJy detections and star formation rates in Abell 2877

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ABSTRACT

The cluster Abell 2877 serendipitously lies partially within a very deep 1.4 GHz radio survey, the Phoenix Deep Survey, made with the Australia Telescope Compact Array. Of the 89 cluster members 70 lie within the radio survey area, and 15 of these (21%) are detected down to flux density levels of 50 μJy. The origins of the radio emission are due to either very low powered AGN or star-formation processes, or some combination of the two. The low power of some of these radio sources implies levels of star formation as low as 0.06 $M_{\odot}$ yr^{-1}, if star-formation is the origin of the radio emission. An investigation of low level star-formation and weak AGNs is presented, and a comparison between the cluster galaxies detected in the radio survey and field galaxies of similar apparent magnitude is made.

Poster 28

Density-bounded HII regions and their effects on the ionized diffuse interstellar medium

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ABSTRACT

A grid of models using the photoionization code CLOUDY was built in order to study the internal structure as well as the spectra of density-bounded HII regions. The results of the models were compare to the spectra of observed HII regions in different spiral galaxies, yielding that some of them are indeed density-bounded. Finally, considerations about the possibilities that the escaping Lyman continuum photons are responsible for the ionization degree observed for the interstellar medium in galaxies are discussed.

Poster 29

An Infrared Stellar Library for Spectral Synthesis of Starburst Galaxies

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ABSTRACT

Infrared wavelengths provide a unique opportunity to study the most obscured stellar populations in starburst galaxies. Recent development of infrared instrumentation has made it possible to measure weak metal absorption features. We are developing diagnostic tools for the starburst age, metallicity, and initial mass function using these features. We have obtained high resolution ($R \approx 2000$ at H($1.6\mu m$) & $R \approx 3000$ at K($2.2\mu m$)) spectra of over 200 red giants and supergiants. These stars dominate the infrared emission in starbursts. Our library spans a range of effective temperatures, and covers abundances from $[Fe/H] \simeq -2.2$ to $+0.3$. The strength of a number of spectral features was calibrated against stellar parameters. We will include these calibrations in an evolutionary population synthesis model.

Poster 30

Testing the AGN-Starburst Connection in Seyfert Galaxies

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ABSTRACT

Starbursts have been proposed as a possible mechanism to fuel the central engines in active galaxies. The strength of the CO band at $2.3\,\mu$m can be used to constrain the contribution- if any - of young stars produced in a starburst event in the central regions of Seyfert galaxies. The CO feature is formed in the extended atmospheres of cool stars (red giants and supergiants), which tend to dominate the stellar populations of starburst galaxies. The CO feature is stronger in young red supergiants than in old red giants, providing a robust starburst indicator. We have obtained K-band spectra of a sample of 44 Seyfert 1 and Seyfert

2 galaxies, together with JHKL-band aperture photometry. The observed CO indices appear diluted by the presence of a non-stellar component (most likely, warm dust surrounding the active nucleus). We assumed that the excess in the observed K-L colors is entirely due to the non-stellar component, and this excess was used to correct for the dilution effect. A comparison of the corrected CO indices for the Seyfert galaxies with a sample of 21 similarly treated starburst galaxies shows no clear evidence for an excess of star formation in Seyferts.

Poster 31

Compact Starburst Galaxies at Low and Intermediate Redshift

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ABSTRACT

We present the results of a photometric and morphological analysis of compact, luminous emission-line galaxies at low and intermediate redshift. We establish a galaxy classification system based on a robust, four-dimensional parameter space of fundamental properties (color, image concentration, asymmetry, and surface brightness) that can be used over a broad range in redshift to define comparable samples in other surveys. The aim of our study is to characterize the evolution of this class of galaxies from $z \sim 1$ to the present: how does the space density of these sources vary with look-back time, and how do the characteristics of the population change? The intermediate-z ($0.1 < z < 0.8$) galaxies we have analysed are small but luminous, blue emission-line objects that are distinctly different from "normal" Hubble-type galaxies: their mean surface brightness is $2 - 3$ magnitudes brighter than for normal galaxies of comparable color, and their asymmetries are greater. We suggest calling these samples members of a more general class of "Luminous Blue Compact Galaxies" (LBCGs). Within the LBCG class there are distinct sub-classes, separated by differences in image structure. As their star formation rates decrease, these sub-classes may evolve into separate morphological types. The low-z ($0.05 < z < 0.1$) sample in our study consists of ~ 35 compact, luminous emission line galaxies, selected from the Palomar Transit Grism Survey (Schneider *et al.* 1995). Structural properties are derived from multi-aperture surface photometry of high-resolution WIYN images. Given the four-dimensional classification system we can identify low-z LBCGs, and based on this estimate their space density. We can also explore the photometric and morphological properties and the correlations between them, and compare these to the intermediate-z LBCGs.

Poster 32

Stellar populations in near low luminosity AGNs

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ABSTRACT

We present high resolution (0.44 Å per pixel) long slit spectra of a sample of 43 near low luminosity active galactic nuclei. These spectra were obtained with the WHT telescope, using the ISIS spectrograph, and cover a wide spectral range, from $\sim$ 3550 Å to $\sim$ 5350 Å. A preeliminary analysis of the stellar populations in the galaxies of the sample is carried out. We study the possible connections between activity and star formation in low luminosity AGNs.

Poster 33

Disruption of Galaxies and the Origin of Faint Intraclaster Starlight in Coma

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ABSTRACT

Using N-body numerical simulations we examine possible mechanisms of the origin of intraclaster starlight features recently discovered in Coma cluster of galaxies. We show that tidal interactions of a "normal" elliptical galaxy with the potential of the symmetrically distributed dark matter do not produce observed intraclaster starlight features. The head-on collision of two normal ellipticals explains the origin of the intraclaster features with the surface brightness $\sim 26 mag/acrsec^2$. Another possibility might be the galaxy tidal interactions with the massive intracluster substructures. A presence in Coma of substructures with the density $\sim 0.01 - 0.1$ part of a central galactic density, and with total mass two-three orders of magnitude larger than mass of a normal elliptical galaxy might account for observations.

Poster 34

The Nature of Low Redshift Lyman Alpha Absorbers

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ABSTRACT

Numerous Lyα absorption lines have been detected shortward of Lyα emission in quasar spectra at low redshifts using ultraviolet observations from Hubble Space Telescope. At least some of these absorbers must arise in gas associated with galaxies, but it is not known what fraction of absorbers arise in galaxies or what kinds of galaxies give rise to Lyα absorption. I develop a model for galaxy disks as Lyα absorbers, where the disks are in equilibrium and confined by a combination of external pressure and gravity, and the gas is ionized by external background radiation. I define a population of galaxies based upon observed distributions of galaxy parameters, and simulate a sample of these galaxies in a box. But putting lines of sight through the box, I show that low redshift absorber counts can easily be explained by galaxies when LSB galaxies are included, and that the majority of absorbers arise in LSB galaxies. Since most absorbers could arise in galaxies that are not usually detected, it will not be possible for an observer to discover directly the nature of Lyα absorbers. Using simulated observations with reasonable selection criteria, I show that absorption arising in LSB galaxies may often be mistakenly attributed to high surface brightness galaxies at larger impact parameters from quasar lines of sight. Less direct tests that involve simulating observational selection effects will be needed to determine the nature of absorbers with observations. I propose two tests, using plots of the unidentified absorber fraction and the absorbing galaxy fraction within some impact parameter, which should allow for a conclusive determination using a data sample a few times smaller than that required for direct tests. While not enough observations are available for a strong conclusion about the nature of absorbers at this time, evidence is seen that absorbers often arise in gas located near galaxies that are lower in luminosity and/or surface brightness than those typically detected in surveys.

Poster 35

Observations of jets in H II regions (HH 444)

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ABSTRACT

Poster 36

Inhomogeneous reionization and CMB anisotropies

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ABSTRACT

We investigate in different CDM scenarios the secondary Cosmic Microwave Background anisotropies produced by the non linear process of a pactchy reionization of the universe due to primordial stellar sources. Their clustering properties are directly taken into account with N-body simulations. We also consider the effect of a primordial effective zero metallicity limit, the natural choice for the first generations of the stars.

Poster 37

Probing the WR Galaxies by Studying their Massive Stars

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ABSTRACT

We have started a systematic spectroscopic program to search for the red bump (around λ 5808) in the Wolf-Rayet (WR) galaxies of the nearby universe. In this work we present spectra, obtained at the 200-inch telescope at Palomar Observatory. We have used theoretical models recently developed by Machado (1998) to reproduce the spectral features like the blue and red bumpds around λ 4686 and λ 5808. These observations confirmed the presence of WR stars of WN and WC subtypes. We estimate the age of the starburst and the ratio of WR/O stars. These results are compared with the predictions of the evolutionary synthesis model.

Poster 38

Superwinds and Interactions in Galaxies: Tidal Acceleration of Gas?

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ABSTRACT

"Superwinds" are observed in several nearby galaxies which belong to strongly interacting systems. Using broad and narrow band images and long slit spectroscopic frames, we investigated the possibility that strong gravitational interactions may drive the outflow of gas. Our approach has been twofold. On the one hand, we examined the velocity field in interacting galaxies where interaction has given rise to obvious gas streaming and stripping; on the other hand, in superwind galaxies, we looked at traces of past and ongoing interactions, and attempted to relate them to the kinematics of the superwind.

Poster 39

The star formation history of galaxies in the UCM Survey

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ABSTRACT

We study the evolutive past of star formation in the emission line galaxies of UCM survey. We combine the stellar continuum of the spectrophotometric population synthesis algorithm of Bruzual & Charlot (1999) with the emission line spectrum of the photoionization code MAPPINGS (Binette 1985,1993). We fit simultaneously both, the stellar continuum and the emission line intensities of the models with the data of UCM galaxies with known metallicity. We have found some new constraints on the SFR history and also de IMF.

Poster 40

A CO Survey of the Large Magellanic Cloud with NANTEN; Giant Molecular Clouds as the Formation Sites of Populous Clusters

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ABSTRACT

A new survey of the LMC has been completed in the 2.6 mm carbon monoxide emission with NANTEN. This survey has revealed 107 giant molecular clouds, the first complete sample of giant molecular clouds in a single galaxy at a linear resolution of $\sim$ 40 pc. The cloud mass ranges from $\sim 6 \times 10^4$ to 2×10^6 $M_\odot$, and the total molecular mass is estimated as 4–7 $\times 10^7 M_\odot$, corresponding to 5–10 % of the HI mass. The molecular clouds exhibit a good spatial correlation with youngest stellar clusters whose ages are $\lesssim$ 10 Myr, demonstrating that cluster formation is on-going in these clouds. On the other hand, they show little correlation with older clusters or with supernova remnants, suggesting that the molecular clouds are being dissipated rapidly in a several Myrs, probably due to the UV photons of massive stars in clusters.

Poster 41

Analysis of Balmer Absorption Profiles for Early Type Stars

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ABSTRACT

The spectral energy distribution (SED) of recent star formation regions is dominated by the more massive and early stars (O and B types). These stars show large and very significant absorption features. The most prominent lines for these stars are the recombination lines of H , HeI and HeII; In particular, the shape of their profiles are very dependent on the luminosity of the star. We explore the potential use of high resolution profiles to discriminate between different luminosity classes, by using the theoretical profiles of Balmer lines from Gonzalez Delgado & Leitherer (1999) models. We calculate growth curves for each line and their dependence on the gravity and on the effective temperature. We will show some of these theoretical growth curves. and our preliminar conclusions will be analyzed and discussed.

Poster 42

Star Formation Rate and Metallicity Evolution in SPH Simulations of Galaxy Formation

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ABSTRACT

The metal enrichment of the interestellar medium and star formation are processes in which the physical mechanisms involved are still poorly understood. Recent observational data have allowed to infer the global history of star formation (cosmic star rates) and the evolution of the density of metals as a function of redshift (Madau *et al* 1996, 1997), from $z = 0$ to $z \simeq 5$. The implementation of supernovae (SNs) explotions and the metal production

in cosmological codes, is crucial in order to understand galaxy formation. We report results on the implementation of chemical effects originated by SNs type II through the yields (Portinari *et al 1998*) due to stars with masses greater than $8M\odot$, and SNI originated by binary systems (Nomoto *et al* 1986), taking into account the metal production of C, Mg, Si, O, and Fe. We use an AP3M+SPH code (Tissera *et al 1997*) in order to follow the evolution of dark matter, gas and stars. We analyse the properties of the simulated galaxies and compare the obtained results with recent observations. This comparison would allow us to discuss implications for galaxy formation.

Poster 43

Surface Brightness Profiles and Colors of $z > 2$ Galaxies in the Hubble Deep Field

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ABSTRACT

We fit elliptical isophotes to the Hubble Deep Field (HDF) WFPC-2 I_{814} and NICMOS J_{110} and H_{160} data to study the rest-frame optical colors and surface brightness profiles of a large sample of high redshift galaxies ($z > 2$). From the HDF images, we can probe to fainter surface brightness limits and smaller angular scales than before, the sizes, shapes, and colors of distant galaxies which will ultimately yield important clues to understanding their structure, formation, and evolution. We fit an exponential law to the surface brightness profile to isolate compact starburst regions from any underlying older and diffuse component. Our preliminary observations of (I_{814}-J_{110}) color gradients in a number of galaxies with $2.0 < z < 3.0$ indicate significant color changes. These observations point to bluer colors towards the center and imply that star formation is centrally condensed in these galaxies. We find that the exponential fits to the surface brightness profiles of galaxies in this redshift range are very good indicating that these galaxies have profiles indicative of disks and no evidence of a spheroidal component. With further analysis, we will determine whether color changes and disky structures are predominant in high redshift galaxies and discuss implications for galaxy formation and evolution.

Poster 44

The Lyman-Alpha Forest tracing the Dark Matter: evolution of the clustering properties with redshift

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ABSTRACT

The Lyman-Alpha Forest tracing the dark matter: evolution of the clustering properties with redshift. Over the past half decade considerable progress has been made in the theoretical understanding of the nature of the Lymanα forest. In all recent models a direct relation between the Lymanα forest and the cosmological structure formation is presumed. Since observational data are available now at almost all redshifts up to $z = 5$ the model parameters for the Lymanα forest evolution are highly constrained. In order to be able to consider the forest evolution along a complete line of sight within the redshift range $5 > z > 0$ we have performed N-body simulations assuming a constant Ω_{baryon} throughout regions at low densities ($N_{HI} < 10^{17} cm^{-2}$), i.e., we assumed that each particle consists of dark matter and baryonic matter at a fixed ratio. For the baryonic matter all relevant cooling processes and heating by photoionization has been taken into account, the backreaction of starformation and of supernovae has been considered in an approximative way (Petitjean et al. 1995, Mücket et al. 1996, Riediger et al. 1998). Since the Lymanα clouds nearly follow the dark matter distribution they could serve as an efficient tracer of the dark matter distribution. Therefore, the clustering properties and their evolution deserves special attention. We have performed a two-point-correlation analysis for the obtained large sample of simulated lines of sight and have investigated the time-dependence of the correlation functions for various cloud populations. The results show a strong increase of the correlation signal with time (towards z=0) for the sample including all absorption lines. The transition is sensitive to the adopted column density threshold. The influence of both the density evolution and clustering/merging processes will be discussed. Further information about the underlying matter distribution can be obtained by observing the absorption lines in the nearby lines of sight of close QSO paires. Using our simulation results we have constructed the probability distribution for line coincidences in dependence on the line-of-sight separation. It shows a clear impact of the filamentary structures of the gas distribution. Since the evolution of the filamentary structures is sensitive with respect to the underlying cosmological models the increasing basis of related observational material could provide further criteria for discriminating between cosmological models. P. Petitjean, J.P. Mücket, R. Kates, A&A (1995), 295, L9-L12 J.P. Mücket, P. Petitjean, R. Kates, R.Riediger,A&A (1996), 308, 17-26 R. Riediger, P. Petitjean, J.P. Mücket, A&A (1998) 329, 30-38.

Poster 45

The annular region of NGC4736: a post-starburst example?

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ABSTRACT

We analyze long slit spectroscopy at three P.A. through the nucleus of NGC4736 in an attempt to understand the possible mechanisms responsible for the formation of the ring of HII regions. The high spatial resolution of the spectra, better than 1 arcsec, allows us to discriminate two rings in what was previously reported as a single one. Both share the same kinematics and are located just at the edge of the two peaks in the velocity curve at both sides of the nucleus of the galaxy. Just outside the rings, at about $55''$ (1.76 kpc) from the nucelus, the velocity dispersion of the ionized gas shows values from 10 to 150 km/s, indicating that the gas surrounding the rings is not in a stationary state. As reported in previous papers, the nucleus displays a typical LINER spectrum but moving a bit further out a clear stellar absorption in $H\alpha$ and $H\beta$ is traced and can be followed out to $20''$ (640 pc) galactocentric distance, the inner border of the annular structures. The underlying stellar population in the bulge, the LINER emission in the nucleus and the chaotic velocity dispersion outside the rings point towards a post starburst origin for the ring structures we now see.

Poster 46

Effects of Radiation Transfer on the Reionization of an Inhomogeneous Early Universe

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ABSTRACT

Effects of the photon transfer on the reionization of an inhomogeneous early universe are studied with numerical calculations. In order to handle correctly the radiation transfer in a three-dimensional space, we have performed full six-dimensional calculations (3-D in space,

2-D in directions, and 1-D for frequency). The numerical simulations have revealed that the radiation transfer effects are still prominent after the percolation epoch because of the collective opacity. In other words, the inhomogeneous universe does not become perfectly transparent against ionizing photons even though strongly self-shielded regions have already disappeared. Consequently, the reionization of the inhomogeneous universe proceeds fairly slowly, in contrast to the prompt reionization in a 'homogeneous' universe, and thus the surface of reionization cannot be determined sharply. As the signature of the uneven reionization surface, the cosmic IR background (CIB) radiation, which is produced by Ly-Alpha photons arising from radiative recombination, exhibits strong anisotropies reflecting the amplitude of the density fluctuations at the epoch. The root-mean-square of the CIB is higher about an order of magnitude than the mean flux. The CIB intensity lies on a level of possible detection by forthcoming IR space telescope facilities.

Poster 47

Starburst-AGN Connection: Radiation-Hydrodynamical Evolution of Galactic Nuclei

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ABSTRACT

We study the formation of an extended gaseous wall driven by the radiative pressure by a circumnuclear starburst as well as an AGN. It is shown that the radiative force by an intensive starburst can support a stable gaseous wall with a scale-height of several hundred parsecs. The covering factor of this large-scale wall decreases on a time-scale of several 10^7 yr, according as the starburst luminosity becomes smaller with the stellar evolution. Since the dusty wall works to obscure the nucleus, it is anticipated that the index of AGN type tends to evolve from higher to lower in several 10^7 yr. On the other hand, if the AGN itself is brighter than the circumnuclear starburst (e.g. quasar case), no stable large-scale wall forms. In that case, the AGN is highly probably identified as type 1. The present mechanism may provide a physical explanation for the putative correlation between AGN type and host properties that Sy2's are more frequently associated with circumnuclear starbursts than Sy1's, whereas quasars are mostly observed as type 1 regardless of star-forming activity in the host galaxies. Finally, we attempt to apply such a novel picture of starburst-AGN connection to some AGNs, in particular, the Circinus galaxy (the closest Sy2 galaxy known).

Poster 48

Line-strength trends across Hubble types - a homogeneous data set

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ABSTRACT

We present spectral indices and kinematics measured across the minor axes of 33 E, S0 and Sa-bc galaxies using long slit spectroscopy. Our aim is to establish line-strengths, in a range of Hubble types, of features often observed in elliptical galaxies. The data, collected in a single observing run, provide a means to place spiral bulges in the context of elliptical galaxies and their formation. The 24 Lick indices evaluated include many sensitive to metallicity of the stellar population (e.g. <Fe>, Mg_2, Fe4668) as well as age (e.g. H_β, H_γ, H_δ). Relative abundances of Fe, Mg and C are investigated by comparison to Worthey (1994) single stellar populations. Correlations of indices with kinematics observed in elliptical galaxies are confirmed and extended to include spiral bulges.

Poster 49

Optical photometry of binary galaxies

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ABSTRACT

We present optical (B, V, R, I) photometric observations of a sample of 30 binary galaxies. We present integrated magnitudes and colors, as well as radial color profiles. This study is a first step to understand as the interaction can change global properties of disk galaxies.

Poster 50

Voyager Observations of Hot Subluminous Stars

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ABSTRACT

We report on sub-lyman alpha fluxes of a sample of hot subluminous stars collected by ultraviolet spectrometers on board the Voyager 1 and 2 spacecraft. For most of the stars in the sample, these data represent the only flux measurements down to the Lyman limit (912 A). We conducted a comparison between Voyager data, complemented with IUE low resolution spectra, and a set of theoretical fluxes computed from updated Kurucz model atmospheres with the aim of determining the effective temperature. Preliminary results are illustrated and compared with other authors' results.

Poster 51

Large Jet driven molecular outflows in Orion

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ABSTRACT

We present high sensitivity and high angular resolution maps of the high Velocity ($v_{LSR} > 30\,\mathrm{km\,s^{-1}}$) CO emission in the $J = 1 \rightarrow 0$ and $J = 2 \rightarrow 1$ lines of the Orion KL region. These results reveal the morphology of the high-velocity CO emission at the

most extreme velocities. High velocity emission have been only detected in two regions: BN/KL (IRc2/I) and Orion–S. The Orion–S region contains a very young (dynamical age of $\sim 10^3$ years), very fast($\sim 110\,\mathrm{km\,s^{-1}}$) and very compact ($\lesssim$0.16 pc) bipolar outflow. From the morphology of the high-velocity gas we estimate that the position of the powering source must be $20''$ north of FIR 4. So far, the exciting source of this outflow has not been detected. For the IRc2/I molecular outflow the morphology of the moderate velocity ($\lesssim 60\,\mathrm{km\,s^{-1}}$) gas shows a weak bipolarity around IRc2/I. The gas at the most extreme velocities does not show any bipolarity around IRc2/I, if any, it is found $\sim 30''$ north from these sources. The blue and redshifted gas at moderate velocities shows similar spatial distribution with a systematic the high-velocity gas we estimate that the position of the powering source must be $20''$ north of FIR 4. So far, the exciting source of this outflow has not been detected. For the IRc2/I molecular outflow the morphology of the moderate velocity increases. The size-velocity relationship is fitted with a simple velocity law which considers a highly collimated jet and entrained material outside the jet moving in the radial direction.

Poster 52

HII region luminosity functions: A new standard candle for extragalactic distances?

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ABSTRACT

We propose the use of HII region luminosity functions (LF) as a possible refined secondary standard candle for extragalactic distances. We have found evidence that there is a change in the properties of HII regions in spiral galaxies at a fixed luminosity in Hα, defined as Strömgren luminosity ($L_{Str} \simeq 10^{38.6}$ erg/s). The key piece of evidence is the presence in the Hα LF of "glitches" (local sharp peaks) at L_{Str}. The invariance and high luminosity of the "glitch" measured in the LF have been proposed in previous works as a possible secondary standard candle, but it is calibrated here by first time. We show the first result obtained for H_0, after the calibration of the glitch using the LF of NGC925, whose Cepheid distance have been determined in the HST key project.

Poster 53

A Dynamical Model of the Spiral Galaxy NGC 3359

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ABSTRACT

Numerical simulations of the interstellar medium under the action of a density wave provide an accurate method for determining the positions of the main resonances in grand design spiral galaxies. Barred spiral galaxies are among the best candidates for a single and well defined wave mode, because bars are standing waves which may share the same pattern speed as the spiral structure. In line with our previous work on determination of the pattern speed in barred spiral galaxies (M 51, NGC 4321, NGC 157 and NGC 7479) by the method employed in this work, we have applied it to the grand–design spiral NGC 3359 and compared the results with previous determinations of the position of the resonances in this galaxy. NGC 3359 is an interesting case to test the theoretical predictions on star formation and nuclear activity and their relation with the existence and position of the main resonances induced by a spiral density wave: it is an isolated grand–design galaxy and possesses a weak bar, an and inner pseudo–ring.

Poster 54

Evolution of the Size-dependent Galaxy Luminosity Function

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ABSTRACT

Galaxy size can be used as a time-inveriant marker to trace the evolution of classes of galaxies independent of the evolution of their stellar populations. We measure structural parameters and photometric redshifts in the Hubble Deep Fields and use these quantities to study the evolution of the size-dependent galaxy luminosity function, and, in particular, its faint end, out to $z = 1$.

Poster 55

Kinematics and Star Formation in the inner 500 pc of Seyfert Galaxies: NGC 1068 and NGC 3227

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ABSTRACT

To understand the circum-nuclear environment of AGN it is essential to obtain data on the detailed distribution and kinematics of the circum-nuclear molecular gas with highest angular and spectral resolution possible. We have chosen two nearby moderately inclined representative Seyfert galaxies (NGC 3227, MGC 1068). For the study of their nuclei we combine our mm-interferometric data with NIR imaging and spectroscopic information to obtain a full image of the structure and the kinematics in the inner 500 pc. The molecular gas kinematics of the inner few parsecs in both Seyfert galaxies can best be described by a thin warped disk rather than motion in a bar potential. The analysis of the NIR data of NGC 3227 suggests a compact nuclear stellar cluster with an age of about 25 Myrs. Furthermore we find evidence that the nuclear star formation is episodic rather than continuously. These findings suggest that (1) there is a link between the host galaxy and the AGN itself provided by the warped nuclear molecular gas disk and (2) there might be an interplay between the nuclear star formation and the AGN activity.

Poster 56

fractalCloud: a recursive algorithm to simulate star formation

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ABSTRACT

A new algorithm to determine the IMF, along the lines of Elmegreen's random sampling of a fractal cloud will be presented. The algorithm uses a recursive random tree as the natural data structure to represent a fractal cloud, and includes the effects of feedback from the newly created stars.

Poster 57

Basic Parameters of Turbulence in Stellar Formation Regions According to Maser Observations

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ABSTRACT

The basic characteristics of turbulence - u_o, τ_o and R_o are determined from long-time observations of H_2O maser emission from various regions of stellar formation. Here u_o, τ_o and R_o are characteristic velocity, life-time and space-scale of turbulent motions. These values give Strouhal number $\xi = u_o\tau_o/R_o \ll 1$. It allows to estimate the turbulent diffusivity in these regions as $D_T \cong u_o^2\tau_0/3$. If consider that turbulence is due to compressible motions then parameter ξ_o determines the mean relative compression of the gas: $\Delta V/V \cong \xi_o$. It were considered two types of turbulence - inside the maser "spots" and more large-scale turbulence determined by the motion of groups of spots.

Poster 58

Recent Results on HI Deficient Galaxies in Clusters

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ABSTRACT

By combining previously published 21 cm data and new high-sensitivity observations, we examine the neutral hydrogen content of spiral galaxies (Sa-Sdm) in the vicinity of eighteen nearby clusters showing an ample variety of physical properties. Each galaxy dataset covers a cylindrical region defined by a radial velocity filter around the systemic velocity of the

cluster and a projected radius of 5 Abell radii (r_A) around the peak of X-ray emission (when available), except in the case of Virgo, where membership is restricted to galaxies within $3r_A$ of the cluster center. This latter dataset is the largest: it contains a total of 426 spirals (217 located within $1r_A$ of M87) with well defined HI parameters. We use all the available HI data to investigate in detail possible correlations of the gas deficiency of galaxies with the properties of both individual objects and their host clusters. Following previous work on this subject (see e.g. Giovanelli & Haynes 1985: ApJ, 292, 404; Haynes & Giovanelli 1986: ApJ, 306, 466) the HI deficiency is measured as the reduction in the observed HI mass from the expected value for a galaxy of the same morphological type and linear optical diameter. We use as standards of normalcy for the HI content the HI mass-optical size regressions of field spirals calculated by Solanes, Giovanelli & Haynes (1996: ApJ, 461, 609). Twelve of the clusters investigated —Pegasus, Virgo, A262, A397, A400, A426, A779, A1060, A1367, A1656, A2063, and A2147— show a significant fraction of HI depleted galaxies in their cores ($r < 1r_A$) and are cataloged as HI deficient. Three of the Abell clusters in our sample —A539, A2151, and A3526— contain normal HI masses, while the remaining three non-deficient systems —Cancer, Pisces, and N507— are very loosely organized and weak X-ray sources. The results of the present study will be used in future work to seek for clues on the probable cause of gas deficiency of galaxies in clusters, which may be also responsible for the morphological transmutation of present-day spirals in the cores of the most dynamically evolved galaxy concentrations.

Poster 59

Cool dust and gas in the Small Magellanic Cloud

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ABSTRACT

We present high angular resolution far-infrared images of the Small Magellanic Cloud (SMC), reconstructed from survey and non-survey IRAS data, using the Pyramid Maximum Entropy algorithm. The angular resolutions of the images are 1 arcmin at 12, 25 and 60 μm and 1.7 arcmin at 100 μm, which provides an excellent complement to the recent neutral hydrogen (HI) survey from the ATCA. The 60 and 100 μm data were used, together with a standard dust model, to derive a temperature map and a dust column density distribution, and to investigate the dust-to-gas mass ratio. On the assumption that gas and dust are well-mixed, we speculate that there may be a large amount of molecular hydrogen (H_2) in the SMC, about double the HI mass of $\sim 4.2 \times 10^8$ M$_\odot$ and about 30 times the mass accounted for in CO studies, and/or a large amount ($\sim 10^6$ $M_\odot$) of cold dust (≤ 15 K) not seen by IRAS. Alternatively, an intrinsic variation of the dust-to-gas mass ratio is proposed and its possible correlation with the metallicity variations is discussed. The spatial power spectrum of the dust column density image can be approximated by $P(k) \propto k^{-3.6}$ which shows that, as with the HI power spectrum, there is no preferred scale size for dust clouds.

Poster 60

What heats the bright HII regions in I ZW 18?

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ABSTRACT

We have used the radiation field from a starburst population synthesis model appropriate for the brightest HII regions of I Zw 18 to perform a photoionization model analysis of this object. We have found that, for models whose geometry is compatible with the HST images, the predicted [OIII]4363/5007 ratio is lower than observed by about 30%. This discrepancy is significant and cannot be accounted for by expected inaccuracies in atomic data or in the energy distribution of the ionizing radiation.

Poster 61

Molecular Gas in the Dwarf Starburst Galaxy NGC1569

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ABSTRACT

We present CO 1→0 and 2→1 observations of the dwarf starburst galaxy NGC 1569 with the IRAM interferometer on Plateau de Bure. We find the CO emission is not spatially associated with the two super star clusters in the galaxy, but rather is found in the vicinity of an HII region. With the resolution of our data, we can resolve the CO emission into five distinct giant molecular clouds, four are detected at both transitions. In the 1→0 transition the sizes and linewidths are similar to those of GMCs in the Milky Way Galaxy and other nearby systems, with diameters ranging from $\sim$ 40 to 50 pc and linewidths from 4 to 9 km/s. The (2-1)/(1-0) line ratios range from 0.64 $\pm$ 0.30 to 1.31 $\pm$ 0.60 in the different clouds. The lower line ratios are similar to those seen in typical Galactic GMCs, while values higher than unity are often seen in interacting or starburst galaxies. We use the virial theorem to derive the CO-H_2 conversion factor for three of the clouds, and we adopt an average value of 6.6 $\pm$ 1.5 times the Galactic conversion factor for NGC 1569 in general. We discuss the role of the molecular gas in NGC 1569, and its relationship to the hot component of the ISM. Finally, we compare our observations with blue compact dwarf galaxies which have been mapped in CO.

Poster 62

Detonation of Interstellar Gas and Star Formation

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ABSTRACT

In astronomy there is a large amount of observational data on the phenomenon of sequential star formation (SSF) from a single molecular cloud [1]. In this process a cluster of stars of the same generation creates favorable conditions for the formation of the next-generation stars. A star-forming wave whose velocity is estimated to be 10-30 km/s travels through a molecular cloud of interstellar gas. In the present work, the SSF phenomenon is claimed to have all the features of a detonation process and the star forming wave is treated as a detonation one. One can see a similarity between the structures of a detonation waves (DW) and the structure of the star forming region. For example, each contains a compression region of the original gas, the energy release area in the DW structure corresponds to the next-generation star formation area, and the area of detonation-product expansion corresponds to that of HII-zone expansion and stars. On the basis of the above similarity of the two phenomena we hypothesize that the star forming wave is a detonation one and conservation laws are, therefore, applicable to the description of the SSF just as they are used in classical detonation theory. Following from the simplest assumptions and assuming that only a small portion of the mass of the compressed gas is transformed into stars (0.1-0.2, according to observational data) and that the gas state corresponding to the Jouguet condition is attained in HII regions, the average velocities of detonation and star forming waves are estimated to be at 27 km/s and 13 km/s, respectively. The latter velocity corresponds to observational data. 1. B.G. Elmegreen and C.J. Lada. ApJ, Vol.214, p.725-741 (1977).

Poster 63

NIR Study of Ionization Mechanism of Gas in Starburst and Seyfert Galaxies

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ABSTRACT

We present NIR images and medium resulution optical spectra of some nearby Seyfert and starburst galaxies. The NIR images were taken through the J, H and K' broad-band filters and H_2 1-0S(1), H_2 2-1S(1), Brγ and [FeII] filters. The optical medium resolution spectra cover a wide wavelength interval, form [OII] λ3727 Å to [SIII] $\lambda\lambda$9069+9532 Å. NIR images and optical spectra were used to distinguish between different ionization mechanisms of gas in these two types of galaxies. In order to investigate the spatial variation of the ionization mechanisms, NIR and optical emission-line ratios were expressed as a function of galactocentric distance of the galaxies. From the NIR emission-line ratios, we concluded that, in the case of starburst galaxies there is a change in the H_2 ionization mechanisms along the major axis of galaxies. In the nuclear regions, the most probable excitation mechanism is the fluorescent excitation by stellar UV radiation, while in the extranuclear regions, shock waves in SNRs, resulting from by starburst activity, play the most important role in H_2 ionization. The [FeII] emission is excited by shocks driven by starburst/supernova winds. The H_2 and [FeII] excitation mechanism in the nuclear regions of Seyfert galaxies has a fluorescent origin. We ruled out the UV power-law and favored the contribution by the nuclear activity itself as the principal H_2 fluorescent mechanism. The [FeII] emission arises from the NLR due to photoionization by non-thermal continuum radiation, probably due to X-ray heating. NIR conclusions for Seyfert and starburst galaxies were confirmed by mean of comparing optical emission-line ratios of the sample galaxies with shock and photoionization models, using different optical diagnostic diagrams.

Poster 64

A kinematical study of M82

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ABSTRACT

Some preliminary results of a kinematical study for the nearby galaxy M82 are presented. In this contribution we report the observations of the nuclear region in the H_2 $(1 \rightarrow 0)$ molecular line.

Poster 65

Mergers and The Stability of Disk Galaxies

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ABSTRACT

A large number of satellites around galactic size halos have been found in cosmological simulations (Klypin et al 1999, Moore et al 1999). We study the stability of disk galaxies that undergo mergers using a high-resolution N-body technique inside a cosmological enviroment. We also discuss the properties of the satellites around disk galaxies in a Local Group-like system and compare them with the observations.

Poster 66

Current development of the photo-ionization code Cloudy

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ABSTRACT

The photo-ionization code Cloudy is widely used to model planetary nebulae and obtain information on the physical conditions of the plasma. This code is under constant development, not only to keep the atomic data up to date, but also to enhance the modeling capabilities. This poster will discuss the upgrade of the grain model in Cloudy that is planned for the coming year.

Poster 67

The evolution of galaxies fixed by the equivalence principle and gravitational tests

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ABSTRACT

In previous works it was found that some basic hypotheses used in current theories on gravity and cosmology are tacitly supported by illegal comparisons of quantities measured by observers located in different G potentials. Such relations are inhomogeneous and meaningless because, according to G time dilation experiments, the standards and clocks such observers are physically different "with respect to each other", respectively. After transforming all of the quantities to some common unit system in some well defined potential, according to the equivalence principle and/or experiments, it is found that: a) The G field itself has no energy and the new kind of linear black hole (LBH) has no singularity. b) The increase of potentials produced by universe expansion must be associated with a G expansion of atoms, in just the same proportion, i.e., the average relative values of the distances, velocities and

cosmological redshifts cannot change with the time. From a) and b), the average universe cannot appreciably change with the time. Matter must evolve, rather locally, in closed cycles between states of gas and LBH, and vice versa. A LBH, after absorbing radiation, must decay into a giant gas cloud of H gas that can regenerate a new star system similar to the original one. In particular, a galaxy, after emitting radiation and canceling out randomly oriented angular momentum, must turn into a compact black galaxy (BG) cooled down by a set of LBHs. The last one, after a period of higher order of magnitude than the luminous period, must recover energy enough to regenerate a new galaxy, after a chain of LBH explosions. Most of the new stars must be formed by condensation of the new gas, free of metals, over older star remnants. Thus the really new galaxies must correspond with elliptical galaxies of low temperature and low-density stars, rather free of metals. From differences of the rates of cancellation of angular momentum, between random and preferred orientations, the new galaxy must take, consecutively, the different shapes observed in astronomy. Due to the increasing contribution of G energy, the last luminous volume in a galaxy must occur in the center of the nearly black galaxy. Such region must emit light with strong intrinsic redshifts (gravitational and some scattering). This one must account for the true quasars, i.e., radio-sources of high G redhifts and rather variable luminosities. They must not be confused with normal galaxies of high cosmological redshifts. Statistically, most of the universe must be in the state of BG. The last ones account for the large number of intergalactic phenomena such as the missing mass, gamma radiations and the low temperature of the CMB. Most of the energy liberated in a matter cycle must be gravitational one. Most of it must be converted into other kinds of energies around neutron stars and LBHs, either steadily or rather explosively. This is consistent with a large number of high-energy phenomena such as variable and explosive stars, cosmic jets, and the energies and nuclear compositions of cosmic rays. They are also consistent both with the better-defined mass-luminosity function of main sequence stars and with the higher energy per neutrino emitted by the sun.

Poster 68

The Environment of the Brightest Cluster Galaxies

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ABSTRACT

We present new results in the study of the environment of a sample of 119 Brightest Cluster Galaxies (BCGs) obtained by M. Postman and T. Lauer at the KPNO 4 m and 2.1 m telescopes, and the CTIO 1.5 m telescope. The sample covers the sky with $|b| > 15°$ and is

volume limited with $z \lesssim 0.05$. We have studied how the characteristics of these BCGs are reflected on the local density and the luminosity of the galaxies of the cluster up to a radius of $\sim 160\ h^{-1}$ kpc. We have not found any dependence between the luminosity function of the cluster galaxies and the BCG properties. The main fact observed is an increase of the number of objects around a BCG as the BCG luminosity (or the logarithmic slope of the surface brightness profile, α_{LS}) increases. The most plausible hypothesis is an increase of the dynamical friction around the BCGs as their luminosity increase, due to bigger envelopes. The BCG should be considered an excellent choice for the cluster center. Only clusters with a high offset between the BCG position and the X-ray center show a completely distorted profile, suggesting that, in these cases, the BCG is a bad election for the cluster center. Nevertheless, this high offset is expected only in a few clusters. Also, it seems that the galaxies in the inner part of the cluster are bound to the BCG, due to fact that there is not a clear distortion of the surface density profile when we consider clusters with high offset between the BCG and the cluster velocity.

Poster 69

Distribution and Kinematics of the Molecular Clouds in the Gum Nebula

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ABSTRACT

We have made an extensive search for molecular gas toward the Gum Nebula in the $J=1-0$ ^{12}CO emission at 2.6 mm. The ^{12}CO distribution has been used to identify 82 molecular clouds at $|b| > 5°$, including those toward optically visible cometary globules which are likely associated with the Nebula. Their velocity is significantly deviated from Galactic rotation and the velocity dispersion is as large as ~ 20 km s^{-1}, indicating that they are expanding under the dynamical effects of OB stars and/or supernova explosions. The total mass of these molecular clouds is estimated as $\sim 1.6 \times 10^4 M_\odot$, corresponding to $\sim 10\%$ of the HI gas associated with the Nebula. Most of these molecular clouds are well explained as part of a supershell of $\sim$ 70 - 130 pc radius that is expanding at 10 - 15 km s^{-1}. The total kinetic energy of this shell will require the total energy deposit of $\sim$ (2.1-4.7) $\times 10^{50}$ ergs as the stellar winds and/or the supernova explosions. The massive stars in this region are quantitatively examined as candidates that has supplied this energy.

Poster 70

Counter-Rotating Components in NGC 3521

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ABSTRACT

The Sb galaxy NGC 3521 exhibits apparently normal kinematical properties of gas and stars along its major axis. However, the analysis of the LOSVD reveals strong asymmetries. The high quality of the LOSVD data allowed a decomposition with two Gaussian components discovering two counterrotating components. A similar case is NGC 7331 as reported by Prada et al. (1996). The velocity field is derived from long-slit spectra obtained along the major, minor and 45 degrees intermediate axes. Its analysis reveals the presence of a bar component which is also evident from R-band surface photometry. The observed kinematical decoupling is consequently interpreted as a projection effect of the bar component seen almost end-on which produces locally a greater concentration of retrograde orbits, and does not relate to a specific counter-rotating population.

Poster 71

The Metallicity-Photoionisation relation and Galaxy Evolution

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ABSTRACT

The main properties of emission lines in HII regions and starbursts (line ratios, equivalent widths and colors) are interpretedby Moy, Rocca-Volmerange and Fioc (1999) with the help of the spectral evolution model PEGASE coupled with the photoionisation code CLOUDY (Ferland, 1996). The new version of PEGASE (Fioc and Rocca-Volmerange, 1999) is metal and dust dependent. It gives the metallicity Z(t) and the ionizing spectrum used by CLOUDY to derive the nebular emission for any ionisation parameter U.A relation (Z, U) is determined by fitting a significant observational sample. Constraints on the ages of the star-forming galaxies are also derived.