

Time Table: Speakers and times only (see below for titles and summaries).

Monday 21st

SESSION 1 Chair John Beckman

09:00 – 09:15 Welcome and opening remarks

09:15 – 09:45 Claude Carignan

09:45 – 10:15 Margarita Rosado

10:15 – 10:45 John Beckman

10:45 – 11:15 Isaura Fuentes-Carrera

11:15 – 11:45 Coffee Break

11:45 – 12:15 Mónica Relaño

12:15 – 12:45 Thomas Marquart

12:45 – 13:10 Benoît Epinat

13:10 – 13:30 Philippe Amram

13:30 – 16:00 Lunch

SESSION 2 Chair Claude Carignan

16:00 – 16:30 Phil James

16:30 – 17:00 Lourdes Verdes-Montenegro

17:00 – 17:30 Emanuela Pompei

17:30 – 18:00 Almudena Zurita/Isabel Perez

18:00 – 18:30 Roberto Rampazzo

Tuesday 22nd

09:00 – 09:30 Chantal Balkowski

09:30 – 10:00 Claude Carignan

SESSION 3 Chair Margarita Rosado

10:00 – 10:30 Olivier Hernandez

10:30 – 11:00 Kambiz Fathi

11:00 – 11:30 GHaFaS on display

11:30 – 12:00 Coffee break

12:00 – 12:30 Kambiz Fathi

12:30 – 13:15 DISCUSSION: LARGE PROGRAMMES WITH GHaFaS

13:15 – 15:45 Lunch

SESSION 4 Chair Kambiz Fathi

15:45 – 16:15 Margarita Rosado

16:15 – 16:40 Abel Bernal

16:40 – 17:10 Sylvain Veilleux

17:40 – 18:20 Philippe Amram

18:20 – 18:45 Marie-Maude de Denus-Baillargeon

Workshop Dinner at 20:30 in Santa Cruz de Tenerife (Thai cuisine)

Wednesday 23rd

SESSION 5 Chair Johan Knapen

09:00 – 10:00 Discussion: Joint programmes with GHaFaS and other instruments
10:00 – 11:00 Discussion: Programmes with the GTC-Part I
11:00 – 11:30 Coffee break
11:30 – 12:30 Programmes with the GTC-Part II
12:30 – 13:00 Conclusions and final remarks.

If participants wish, informal discussions can be organized during the afternoon.

Titles and summaries of the presentations

HalpHa survey of the SINGS sample

Claude Carignan

This is an HalpHa kinematics follow-up survey of the Spitzer Infrared Nearby Galaxies Survey (SINGS) sample. The aim of this program is to shed new light on the role of baryons and their kinematics and on the dark/luminous matter relation in the star forming regions of galaxies, in relation with studies at other wavelengths. Emission was detected in 65 of the 75 galaxies of the sample. The observations were made using Fabry-Perot interferometry with the photon-counting camera FaNTOMM on 4 different telescopes, namely the Canada-France-Hawaii 3.6m, the ESO La Silla 3.6m, the William Herschel 4.2m, and the Observatoire du mont Mégantic 1.6m telescopes. The velocity fields are computed using custom IDL routines designed for an optimal use of the data. The kinematical parameters and rotation curves are derived using the GIPSY software. It is shown, for example, that non-circular motions associated with galactic bars affect the kinematical parameters fitting and the velocity gradient of the rotation curves. This leads to incorrect determinations of the baryonic and dark matter distributions in the mass models derived from those rotation curves.

Some of the Astronomical Results of PUMA

Margarita Rosado

PUMA is the Fabry-Perot interferometer working at the UNAM 2.12 m telescope in San Pedro Martir, B.C., Mexico. In this talk I show some of the studies done with this interferometer: Kinematics of star forming regions, Galactic PNe, SNRs, the interplay between gas and stars in irregular galaxies and the kinematics of interacting galaxies.

Inflow in a strongly barred and an unbarred galaxy: FP's required

John Beckman, (with Almudena Zurita, Mónica Relaño, Kambiz Fathi, and the GHaFaS collaboration)

Using a TAURUS cube in H α of the strongly barred galaxy NGC 1530 we show how we could derive not only the two dimensional velocity field, but also the velocity field gradient across the full face of the galaxy. This allowed us to relate the presence of dust lanes and star formation to the presence or absence of strong velocity gradients in the bar. We also show how it was possible to follow gaseous inflow spiralling down towards the nucleus, and that this occurs in the absence of a circumnuclear bar. A similar exercise with GHaFaS for M83 shows how we were able to follow spiral inflow right down to within a few parsec of the nucleus, and this in the absence of even a large bar. Data of this type and quality are uniquely possible with FP techniques, and these examples show that observations which really say something about rival models can be, and are being made.

A multiwavelength study of the kinematics and dynamics of the luminous infrared galaxy pair NGC 5257/58 (Arp 240).

Isaura Fuentes-Carrera

We present the analysis of the processes that are possibly triggering star formation in a pair of luminous infrared galaxies of similar mass and morphological type that are experiencing an early encounter. We use FP observations to derive the extended kinematics of the ionized gas and to study the contribution of circular and non-circular motions. We compare the results to previously published infrared, CO(1-0) and HI observations.

Internal kinematics of HII regions

Monica Relaño

The analysis of the integrated HalpHa emission line profiles of the HII region population in a sample of nearby spiral

galaxies shows the presence of low intensity high velocity components symmetrically located with respect to the most intense central component of the spectrum. With a typical Emission Measure (EM) of ~10% of the total EM of the HII region and velocity values of ~ 60km/s, these symmetric components are interpreted as signatures of shells expanding inside the HII regions. The most probable mechanism producing this phenomenon is the interaction of the stellar winds coming from the central OB stars with the ionized gas. At later times, after the ionized expanding shell is formed, the action of supernovae explosions can produce larger shells that would evolve into neutral hydrogen HI shells observed in the 21cm emission line. The combination of both mechanisms, stellar winds and SN explosions, can reproduce the observed phenomenology of the HI shells showing that the neutral shells most probably had H α shells as their precursors. Making use of GHaFaS, a similar analysis can be carried out observing the HII region population of a sample of nearer galaxies. The spatial and spectral resolution of GHaFaS will help to make a deeper analysis of the kinematics of the HII regions involving a quantification of the parameters assumed in previous studies.

Blue Compact Galaxies with CIGALE"

Thomas Marquart

Blue Compact Galaxies (BCGs) are the best local equivalents to galaxies in the earlier universe because of their low ISM metallicities, often disturbed morphologies and unsustainably high star formation, the trigger of which is yet undecided. We have used the Fabry-Perot instrument CIGALE at the ESO 3.6m to measure the kinematics of a sample of BCGs from the H-alpha emission line. I will show examples of our results and discuss the difficulties in the analysis, both from the ambiguity between kinematical disturbances and feedback-driven winds and from the treatment of non-flattened systems. First steps towards the creation of custom modelled data cubes will be presented. In addition, I will comment on the point-spread-function of the instrument and "H-alpha halos".

Biases in the dynamical studies of high redshift galaxies

Benoît Epinat

One of the main present day astrophysical clues is the mass assembly and galaxy evolution. Local galaxies display large fields of view from which one can obtain high resolution spectroscopic data (velocity fields, velocity dispersion fields, rotation curves). From these nearby galaxies it is possible to perform detailed kinematical and dynamical studies. Unfortunately at higher redshift galaxies have a small apparent diameter and the spatial resolution is limited by atmospheric seeing.

The GHASP sample is a sample of around 200 nearby galaxies observed using Fabry-Perot techniques in order to obtain high resolution and seeing limited data cubes around the H α wavelength, from which are extracted kinematical maps. This sample is projected at high redshift in order to study the biases in the dynamical studies and to disentangle distance or resolution effects from evolution effects. We test several methods to extract galaxy parameters such as the maximum velocity and the local velocity dispersion and compare the projected data with published high redshift data observed with GIRAFFE, OSIRIS, and SINFONI

The GHASP programme and some scientific suggestions for GHaFaS

Philippe Amram

The GHASP survey consists of 3D H α data cubes for 202 spiral and irregular galaxies, ranging in a large panel of morphological types and absolute magnitudes, for kinematics analysis. A part of this sample has already been used to study the distribution of luminous and dark halo components along the Hubble sequence for a wide range of luminosities. Our results point at the existence of a constant density core in the center of the dark matter halos rather than a cuspy core, whatever the type of the galaxy from Sab to Im. This extends to all types the result already obtained by other authors studying dwarf and LSB galaxies. Whatever model is used (ISO or NFW), small core radius halos have higher central densities, again for all morphological types. We confirm different halo scaling laws, such as the correlations between the core radius and the central density of the halo with the absolute magnitude of a galaxy: low luminosity galaxies have small core radius and high central density. We find that the product of the central density with the core radius of the dark matter halo is nearly constant, whatever the model and whatever the absolute magnitude of the galaxy. This suggests that the halo surface density is independent from the galaxy type. Finally, optically small and blue galaxies tend to have a small dark matter halo core radius.

Star-forming satellite galaxies

Phil James

A search has been performed for star-forming satellite galaxies, effectively Magellanic Cloud analogues, around local disk galaxies. The technique involves detection of the companion in a narrow-band H α filter, thus removing almost all line-of-sight contamination. The properties and statistics of the detected companions will be discussed, and a proposal made for follow-up FP observations, to further constrain the SF properties and kinematics of these

companions, and the future evolution of their host systems.

HI mapping of asymmetric isolated galaxies in the context of the AMIGA project

Lourdes Verdes Montenegro

The aim of AMIGA project (Analysis of the interstellar Medium of Isolated GALaxies) is to build and analyse a complete and statistically significant sample of the most isolated galaxies of the local Universe, which will serve as a reference sample to determine the influence of interactions in the evolution of galaxies. We have already compiled a multifrequency data for a set of 1000 isolated galaxies, and the data are being made public through our Web page (<http://www.iaa.es/AMIGA.html>). Recently we have started the study of well selected subsamples from AMIGA catalog. In this talk I will refer to our preliminary results for those isolated galaxies showing the largest asymmetries in their HI distribution. VLA-HI maps have been obtained for them and we will propose some explanations and discard others for the origin if these intriguing asymmetries in nurture free galaxies. Since HI data do not provide enough angular resolution for the central parts of these galaxies, we consider them well justified targets for FPs instruments.

Hunting for compact groups in the southern hemisphere: the near and far view

Emanuela Pompei

Presentation of the optical spectroscopic and imaging survey of approximately two samples of 130 groups each in the local ($z < 0.03$) and not-so-local ($z \sim 0.12$) universe, with deeper follow up in optical and radio, and possible follow-up projects which can be carried on with a Fabry-Perot.

Where are the stars of the bar of NGC 1530 forming ?

A. Zurita & I. Perez

We present our results on recent star formation in the environment of the NGC 1530 bar from Halpha Fabry-Perot and complementary observations. These support the hypothesis that massive stars form in the trailing side of the bar dust lane and they age as they cross the bar. 2D kinematic information is crucial to unveil/constrain the conditions which either favor or inhibit star formation in bars.

The eventful life of galaxies in low density environments

Roberto Rampazzo

In the study of galaxy evolution, very poor galaxy aggregates containing Es and isolated E galaxies deserve a special value. The former class includes the simplest systems where the effect of the ongoing interaction on the galaxy evolution can be directly tested. In addition, Es are widely considered the fossil evidence of the process of galaxy evolution. We present our multi-wavelength approach to the studies of Es and their environment and the information we expect to obtain from the ionized gas properties mapped by High-Res Fabry-Perot observations and Low-Res Tunable Filters.

Clusters in Galaxies

Chantal Balkowski

I will summarize the environmental effects on galaxies in clusters and present examples of multiwavelength observations of galaxies in the Virgo cluster and the future observations which can be done in Virgo and other clusters.

Deep VIRGO Survey

Claude Carignan

We propose to collect a uniform catalog of H K kinematics for a sample of 105 gas-rich galaxies that are part of a complete sample of 235 Virgo cluster galaxies with homogeneous optical and infrared photometry covering a broad range of luminosities, colors, and effective radii. Such a comprehensive dynamical study does not exist and will allow a variety of investigations of galaxy structure and evolution including a direct measurement of the galaxy circular velocity function, $N(V)$, and testing claims of bimodality in the structural properties of cluster galaxies. The relative number of galaxies as a function of their maximum circular velocity is a robust prediction of cosmological models that has never been directly tested (for lack of complete, uniform samples). Our sample will be the first of its kind designed to probe galaxy dynamics uniformly below the fundamental galaxy transition scale of $V \sim 120$ km/s. Among others, the (currently ill-defined) low-mass end of $N(V)$ set stringent constraints for halo accretion histories.

GHaFaS 3D Fabry-Perot state of the art

Olivier Hernandez

GHaFaS a new Fabry-Perot system, is now available at the William Herschel Telescope. It was mounted, for the first time, at the Nasmyth focus of the 4.2 meter WHT on La Palma in July 2007. Using modern technology, with a spectral resolution of the order $R \sim 15000$, and with a seeing limited spatial resolution, GHaFaS will provide a new look at the H-alpha emitting gas over a 4.8 arcminutes circular field in the nearby universe. Many science programs can be done on a 4.2 metre class telescope in world class seeing conditions with a scanning Fabry-Perot. Not only galaxies but HII regions, planetary nebulae, supernova remnants and the diffuse interstellar medium are subjects for which unique data can be acquired rapidly. This talk will present the instrument, the Fabry-Perot coupled to IPCS technology, and the first results of GHaFaS.

First results with GHaFaS and leads to the future

Kambiz Fathi

I will present the first results from the first two observing runs with GHAFAS.

Software aspects for use with GHaFaS

Kambiz Fathi

GHaFaS sits at the GHRIL Nasmyth platform of the WHT, which implies a natural rotation of the observed field. I will present a set of softwares that we use for by software de-rotating the field to reconstruct the observed field. The de-rotation procedure implies no light-loss and recovers any other optical defects that could be present in the observed data cubes. There is however room for improvement, however, the current software package has all the potential in dealing with the details and could be used for data from any other instruments.

GHaFaS on Display

GHaFaS will be displayed to the audience at the front desk of the seminar room. Questions can be asked, and the instrument will be in detail presented.

Discussion: Large Programme with GHaFaS

PUMA The UNAM Scanning Fabry-Perot Interferometer, Technical Review

Abel Bernal

PUMA is a scanning Fabry-Perot spectrograph developed in mid-Nineties by the instrumentation department of the UNAM-astronomy institute. In this talk I will discuss design guidelines, specifications, and the performance obtained during 10 years of operation in the 2 m telescope at the San Pedro Mártir observatory.

NEFER, a Fabry-Perot interferometer for incorporation into OSIRIS on the GTC

Margarita Rosado

A High Resolution Fabry-Perot Interferometer for OSIRIS in the GTC is proposed in order to study the kinematics of extended objects. Several astronomical projects which could be carried out with this instrument are discussed as well as the main characteristics of the required FPs and their adaptation in the OSIRIS layout.

The Maryland-Magellan Tunable Filter (MMTF)

Sylvain Veilleux

The Maryland-Magellan Tunable Filter (MMTF) is installed in the IMACS spectrograph on Magellan's Baade 6.5m telescope at Las Campanas Observatory. The MMTF is based on a Fabry-Perot etalon with clear aperture of 150mm. It operates in low orders (close plate spacings) to provide a transmission bandpass which is adjustable from ~ 5 to ~ 25 Angstrom. The central wavelength of the filter is also tunable from 5000 to over 9200 Angstrom. The field of view of the imager is 27 arcminutes in diameter, and the diameter of the central monochromatic region of the field is ~ 10 arcminutes at 6600 Angstrom.

Fabry-Perots/Tunable Filter in 8-10-m Telescope: Implementation, Science, Perspectives

Hector Castañeda

I will present an overview of the tunable filter instrumentation available in Large Telescopes at the present, their characteristics, performance (measured or estimated) and the main science programs that are developed with these instruments.

The 3D-NTT and BTFI Instruments

Philippe Amram

The 3D-NTT will be a visitor instrument for the NTT for 2009, built by LAM (Marseille) , GEPI (Paris), and the LAE (Montr´eal, Canada) with some other collaborations. It is a spectro-imager based on new generation tunable filters. The instrument offers two modes: a low resolution mode (100-1000) with a tunable filter, and a high resolution mode (10 000 - 40 000) using a scanning Fabry-Perot associated with a tunable filter (to select the interference). The high resolution mode, associated with an EMCCD offers a FOV of 9' while the low resolution, using a classical CCD, gives a larger FOV of 22'.

The Brazilian Tunable Filter Imager (BTFI) represents an instrument strategy that optimizes the science potential for optical spectroscopy with the SOAR telescope, with its emphasis on high image quality and its use of Ground Layer Adaptive Optics (GLAO) for image enhancement in the optical over a wide field of view. The BTFI is thus designed to supply tunable filter imaging for both at bent Cassegrain: seeing-limited area spectroscopy with a field-of-view of ~6' sampled at ~0.2" (f/4 camera) and at SAM's VI-port: GLAO-fed area spectroscopy with a field-of-view ~3' sampled at ~0.1" (f/8 camera). The BTFI employs Fabry-Perots (FPs) in order to achieve high spectral resolution ($R \sim 30,000$). To cover the low spectral resolution domain, the BTFI will utilize a new double-pass VPH grating technology (the Imaging Bragg Tunable Filter; or iBTF) to achieve ultra-low ($5 < R < 50$) to intermediate ($R \sim 2000$) spectral resolving powers.

Development of high-performance reflective coatings for the tuneable filter and higher order interferometer of the 3D-NTT

Marie-Maude de Denus Baillargeon

The 3D-NTT is a novel instrument to be commissioned at the New Technology Telescope. It's main feature is the simultaneous use of two Fabry-Perot etalons: a high-order etalon coupled to a low-order one, the latter also capable of working alone as a tunable filter. The versatility of the instrument requires very demanding requirements for the coatings characteristics of the etalons. Both devices shall display high throughput and constant finesse over the entire wavelength range and excellent uniformity performances for large coating areas. A description of the progress achieved in the realization of these coatings as well as an overview of the scientific projects planned for this instrument will be included.