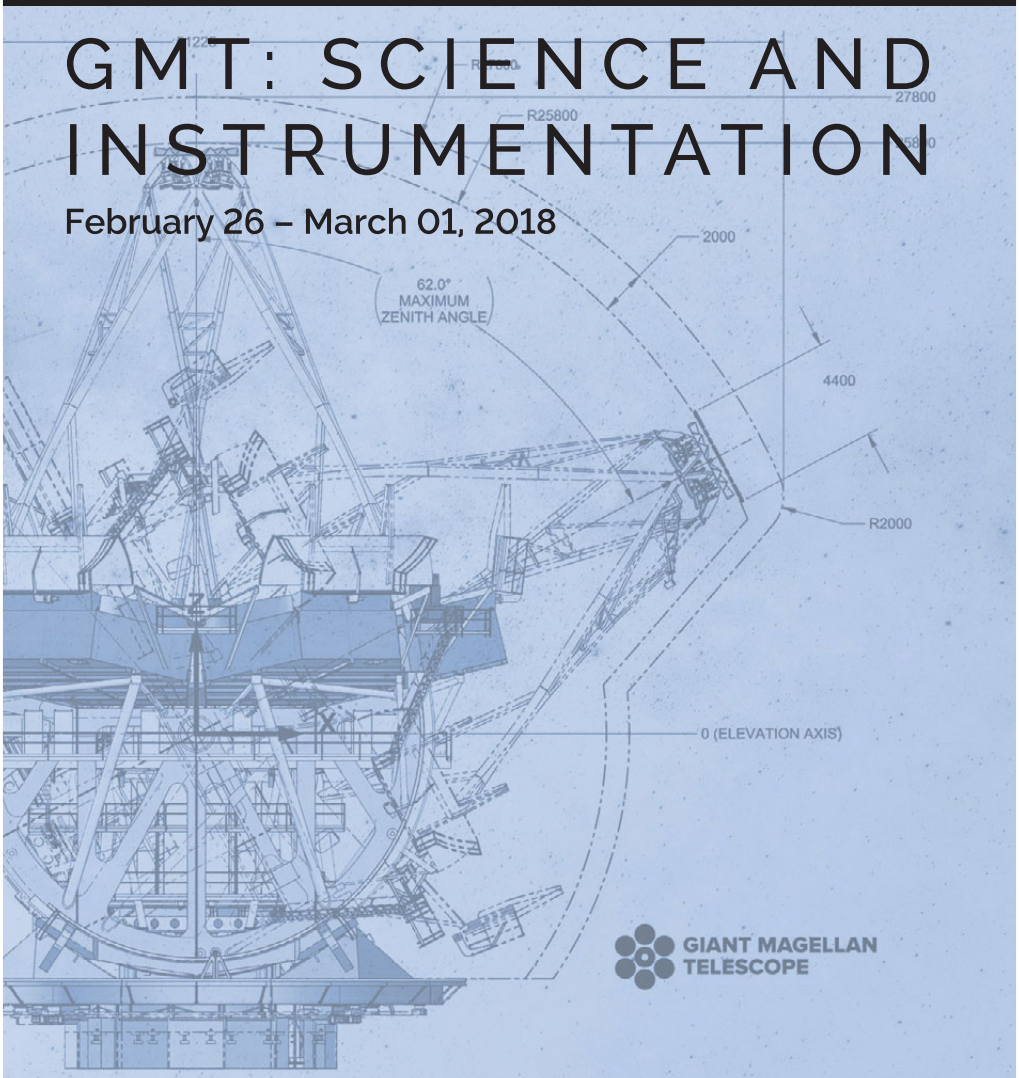
XVIII IAG/USP ADVANCED SCHOOL ON ASTROPHYSICS

GMT: SCIENCE AND INSTRUMENTATION

February 26 – March 01, 2018



XVIII IAG/USP ADVANCED SCHOOL ON ASTROPHYSICS
GMT: SCIENCE AND INSTRUMENTATION

Organizing Committee

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Roderik Overzier
Observatório Nacional – ON

PROGRAM

	Monday Feb/26	Tuesday Feb/27	Wednesday Feb/28	Thursday Mar/01
08:00-08:30	Registration			
08:30-09:00	Opening			
09:00-10:30	Lecture I	Lecture IV	Lecture III	Lecture II
10:30-11:00	Coffee-break	Coffee-break	Coffee-break	Coffee-break
11:00-12:30	Lecture II	Lecture I	Lecture IV	Lecture III
12:30-14:15	Lunch	Lunch	Lunch	Lunch
14:15-15:15	Invited talk 1	Invited talk 2	Invited talk 3	Invited talk 4
15:15-15:45	Coffee-break	Coffee-break	Coffee-break	Coffee-break
15:45-17:15	Lecture III	Lecture II	Lecture I	Lecture IV
17:15-18:00	Discussion	Discussion	Discussion	Discussion
18:00-19:00		Posters	Posters	

LECTURES

Lecture I
Technical Challenges and Science Goals of the GMT
Rebecca Bernstein – Carnegie Observatories, Pasadena, CA, USA

Lecture II
Exoplanetary Science with GMT
Andrew Szentgyorgyi – Harvard-Smithsonian CfA, Cambridge, USA

Lecture III
Sharp images and wide fields: the scientific power of GMTIFS and MANIFEST on GMT
Matthew Colless – Research School of A&A, Australian National University, Canberra, Australia

Lecture IV
GMTNIRS and the Promise of High Resolution Spectroscopy in the Infrared
Daniel T. Jaffe – Department of Astronomy, University of Texas, Austin, USA

INVITED TALKS

Talk 1
Feeding and feedback in AGN
Thaisa Storchi-Bergmann – UFRGS, Porto Alegre/RS

Talk 2
Stellar rotation, magnetic activity cycles and its consequences for precise radial velocity surveys
José Dias do Nascimento – UFRN, Natal/RN

Talk 3
Unlocking the physics of the high redshift universe with optical spectroscopy on ELTs
Roderik Overzier – Observatório Nacional, Rio de Janeiro/RJ

Talk 4
GMACS and the GMT-Brazil instrumentation projects
Claudia Mendes de Oliveira – IAG/USP, São Paulo/SP

1. The X-ray Background of XMM-Newton Observations: A case study of the cool-core clusters A1795 and A85

N. S. S. de Almeida (IAG/USP); G. B. Lima Neto (IAG/USP)

Observations of extended objects require a thorough treatment of the background. As is the case for optical studies for example, X-ray methods of background subtraction usually employ blank-sky data to estimate its emission. The major problem of this approach is that it's difficult to differentiate the contribution of each component of the diffuse background. In this work we apply the method outlined in Snowden et al. (2008) to XMM-Newton observations of the intra-cluster gas that permeates A1795 and A85, that avoids blank-sky data and applies a first principles approach. With it we are able to identify, quantify and subtract the contribution of each component of the background separately and obtain temperature and metallicity profiles of the gas.

2. Mapping the density of particles over the surface of Asteroid (101955) Bennu

A. Amarante (FEG/Unesp); O. C. Winter (FEG/Unesp); R. Sfair (FEG/Unesp)

The circumgalactic medium (CGM) is defined as the diffuse gas around galaxies, within which large-scale inflows and outflows take place. The CGM gas has been probed out to about 3 virial radii using spectral features in QSOs that are in the line-of-sight of galaxies, but it has never been measured directly. It is important to study the structure of the CGM in order to determine the extent of metal transport and recycling and the mechanisms of galaxy quenching in halos and large-scale environments. We have the first goal of studying galaxy stellar halos by stacking broad--band images of SDSS and it has the ultimate goal of studying the CGM by stacking narrow-band images of galaxies of similar masses and morphological types, at a given redshift, for nearby objects ($z < 0.03$). At this moment we stack SDSS images for the study of the stellar halos of the galaxies. We will present some partial results for this work.

3. Nuclear and Circumnuclear Properties of S0 Galaxies: Stellar Archeology

I. S. Andrade (IAG/USP); J. E. Steiner (IAG/USP); T. V. Ricci (UFFS); R. B. Menezes (IAG/USP)

S0 galaxies are transitional objects between elliptical and spiral galaxies, with characteristics of both. Generally have little dust, gas, and residual star formation. With a complete sample, limited in magnitude of 17 spiral galaxies in the southern hemisphere made with the IFU/GMOS Gemini telescopes we are able to study nuclear and circumnuclear properties of gas, dust and stars populations, such as emission lines, kinematics and stellar archeology. After reduction and data processing, we fit nuclear and circumnuclear galaxy spectrum by combining Simple Stellar populations of different ages and metallicities, reconstructing the full Star-Formation History from the strength of each component, using the STARLIGHT code. Preliminary results from the analysis of 15 galaxies show that 7 of these have high metalicity and old (~ 10^10 years) stars and one peak of star-formation. Another 7 galaxies show, mostly, high metalicity stars with two star-formation's peaks, the latter being explained by merger events. One of the sample galaxies, NGC 5102, is the most atypical, since presents stars with high (0.05), medium (0.004), and low (0.001) metalicities and also very young (~ 10^8.5 years).

4. Searching for extended circumgalactic halos around galaxies

L. Azanha (IAG/USP); C. Mendes de Oliveira (IAG/USP)

The circumgalactic medium (CGM) is defined as the diffuse gas around galaxies, within which large-scale inflows and outflows take place. The CGM gas has been probed out to about 3 virial radii using spectral features in QSOs that are in the line-of-sight of galaxies, but it has never been measured directly. It is important to study the structure of the CGM in order to determine the extent of metal transport and recycling and the mechanisms of galaxy quenching in halos and large-scale environments. We have the first goal of studying galaxy stellar halos by stacking broad--band images of SDSS and it has the ultimate goal of studying the CGM by stacking narrow-band images of galaxies of similar masses and mor-

phological types, at a given redshift, for nearby objects ($z < 0.03$). At this moment we stack SDSS images for the study of the stellar halos of the galaxies. We will present some partial results for this work.

5. The motivation to study our Galactic Center black hole in gamma-rays

F. M. Cafardo (IAG/USP); R. S. Nemmen (IAG/USP)

Sagittarius A* (Sgr A*), a compact radio source in the center of the Milky Way, is a supermassive black hole with 4e6 solar masses. There are several signals that Sgr A* has been active in the past. Although Sgr A* is also known to be a highly variable source, the nature of its high energy flare emission is still not understood. The Sgr A*'s gamma-ray spectrum and variability at energies >100 MeV is essentially unconstrained. We aim to use Fermi Space Telescope data to enlighten this issue.

6. Fossil Groups: A weak lensing analysis

M.Castejon (IAG/USP); E. S. Cypriano (IAG/USP)

Fossil groups are special structures in which the central galaxy corresponds to the majority of the overall group luminosity. They are empirically defined to be groups in which the central galaxy is 2 magnitudes brighter in the r band than the second brightest satellite galaxy inside r_200, and have extended X-ray halos. The goal of this work is to study five fossil groups using the technique of weak gravitational lensing. For this study we have images from the CFHT in two bands (g, r) with excellent depth and quality. The initial goal is to estimate the masses of these systems by fitting NFW profiles. We also aim to construct matter distribution maps of these structures and analyse their luminosity functions in order to study the mass-luminosity ratios for these groups.

7. A pilot study of Clif AGNs in the NIR

F. Cerqueira-Campos (INPE); A. Rodríguez Ardila (LNA)

Recently, a new set of active galactic nuclei (AGN), named coronal-line forest AGN (CLIF AGN), were introduced in the literature. The optical spectrum of these galaxies is characterized by strong high ionization forbidden lines, and others properties that contrast with what is found in typical AGNs. The model predicts that the orientation of the torus with respect to the observer is restricted to a certain angular interval. However, the analysis made for this prediction was exclusively derived from information obtained through spectra in the visible region. In this work, we developed tools that allowed the analysis of the spectra of these galaxies in the optical, obtained by Sloan Sky digital survey release 7, and infrared, obtained by the NASA Infrared Telescope Facility, using Penalized Pixel-Fitting software. This analysis includes the identification and removal of the contribution by the stellar population of the host galaxy and and the study of other kinematic characteristics.

8. A panchromatic approach of the stellar populations in NGC4303

N. Z. Dametto (UFRGS), R. Riffel (UFRGS); L. Colina (CAB/Spain), L. G. Hann (UFRGS), R. A. Riffel (UFSM), T. Storchi-Bergmann (UFRGS), J. Piqueras López (CAB/Spain)

We have performed a panchromatic stellar population (SP) synthesis in NGC4303, from 0.12 to 2.4μm. The results indicate the need of the three SP components (SPCs) in the nuclear region of the galaxy to fit the entire wavelength range spectrum, from the UV to the NIR. In fact, this results are well reproduced when fitting only the blue part of the spectrum, we can see an indicative of a rather young SPC of (5.5 - 6.5Myr) coexisting with an older SP of 3Gyr. In addition, the intermediate-age SPC is also found, but with a larger spread in age. From these preliminary tests we are favorable to believe that the use of the NIR adds valuable information to the fits, once it penetrates deeper into the dust layers, unveiling obscured sources that would be missed using only the bluer region of the spectrum (UV/optical).

9. The relation between the physical properties of the intracluster plasma and the large scale structure of the Universe

N. C. del Coco (IAG/USP); G. B. Lima Neto (IAG/USP)

The aim of this project is to look for relations between physical properties of galaxy clusters and groups – per example, the presence or not of a cool--core) with the environment around it, i.e., the large-scale structure of the universe, up to z ~ 0.5. A good way to study clusters and groups is from the hot plasma in the intracluster medium (ICM), which radiates by thermal bremsstrahlung thus is observed in X-ray. Also, the ICM emits some metal lines (Fe, Ni, S, Mg, etc). With this informations, is possible to infer its radial density profile, temperature and metallicity. We will use online data from CXC, XMM-Newton and ROSAT observatories. The environment surrounding the selected clusters will be evaluated by the spatial galaxy distribution in the optical (e.g. its morphology, density contrast with respect to the average universe density), using Sloan Digital Sky Survey (SDSS). Therefore, we expect to show how these structures evolve, evidencing the dynamical properties of galaxy clusters and groups.

10. The correlations between AGN and cluster of galaxies through the optical and X-rays

J.H. Esteves (IAG/USP); G. B. Lima Neto (IAG/USP)

The objective of this project is to investigate aspects of the correlation between the nature of Active Galactic Nuclei (AGN) and the galaxy cluster environment. This will be done based on a sample of clusters observed in X-ray with Chandra and by the SDSS in the optical, exploring a range of redshift, mass and dynamic states.
We have selected the AGNs based on X-ray point sources present in cluster observations, with counterparts in the optical. Our focus is to investigate how the properties of AGNs such as color and X-ray hardness-ratio changes as a function of the projected cluster radius. Also, we study how these relations depend on the clusters (cool and non cool core, disturbed and relaxed clusters). Preliminary results will be presented.

11. Systems Engineering in the interface study phase of MANIFEST
D. Faes (IAG/USP); A. Souza (UFMG, IMT); M. Almeida (UniVap); K. Kuehn (AAO)

The GMT has an unusually large field of view (FoV) for an ELT. The Many Instrument Fiber System (MANIFEST) is a GMT facility fiber system proposed to make full use of the 20' diameter FoV. In December 2017, the Australian Astronomical Observatory (AAO) started an interface study of this fiber system, aiming at providing integration with the GMT first-generation spectrographs GMACS and G-CLEF. The development of the GMT observatory applies Systems Engineering (SE) procedures, and facility instrumentation is no exception. Here we describe some of these processes that are being applied in the MANIFEST project as part of the SE group partnership from IAG/USP with the AAO, and that aim to meet the observatory's demands for project planning and control.

12. Dynamical modeling of LMC Be Stars lightcurves
A.L. Figueredo (IAG/USP); A. C. Carciofi (IAG/USP) ; L. R. Rímulo (Uniandes/Colombia)

Classical Be stars are rapidly rotating B stars surrounded by self-ejected matter forming a circumstellar disk whose evolution is governed by viscosity. Although the viscous decretion disk model is able to satisfactory explain most of observational characteristics, the mechanism responsible for the Be phenomenon remain no fully understand. The mass injection in the disk can be unstable, harbor variations in all observables in a wide range of time scale since years, months, days and even hours. The light curves of Be stars that undergo events of disk formation and dissipation offer an opportunity to study disks' fundamental properties. A pipeline was developed to model these events that uses a grid of synthetic light curves, computed from detailed hydrodynamic simulations combined with radiative transfer calculations. Comparison between model and data was made possible by two empirical laws we discovered, which closely match the photometric behaviour of the events. A sample of Be stars from the Large Magellanic Cloud was analyzed for this study using a preliminar grid models.

13. Simulation of an Adaptive Optics Laboratory for Extremely Large Telescopes

J. P. S. Gabriel (UFABC); M. A. Leigui de Oliveira (UFABC)

The Extremely Large Telescopes (ELTs) suffer with distortions caused by the Earth's atmosphere. This is a problem, because the wavefront behaves randomly, so with the help of Adaptive Optics (AO), we can adjust these distortions with an optomechanical system that measures and corrects the wavefront from celestial objects, but all of these it's only possible because of the deformable mirror.
The objective of this work is to transform the theory of adaptive optics into software, where it is possible to make numerous measures that help in the construction of a physical device that can recreate the entire process of adaptation of wavefronts, with the purpose of correcting them order to see the expected image.

14. Multi-technique Study of the Dynamical Evolution of Be Star omega CMa

S. M. R. Ghoreyshi (IAG/USP); A.C. Carciofi (IAG/USP); Th. Rivinius (ESO/Chile); D.M. Faes (IAG/USP); A. Rubio (IAG/USP); A. L. Figueiredo (IAG/USP)

We model the light curve of the Be star omega CMa using the viscous decretion disk model. The data encompasses 33 years of observations, and contains 4 events of disk construction and dissipation. Our analysis allowed us to determine the viscosity parameter (alpha) of the gas, as well as the rate of mass and angular momentum loss for each event. We find that alpha is variable, ranging from 0.1 to 1.0, and that build-up phases have larger alpha values than the dissipation phases. Additionally, we find that, contrary to what is generally assumed, during dissipation the outward mass flux is not necessarily zero, meaning that omega CMa does not experience a true quiescence during dissipation but, instead, switches between a high mass loss rate state to a low mass loss rate one during which the disk quickly assumes an overall lower density but never zero. In this contribution, we extend the modeling to other observables such as polarimetry and line profiles. The importance of looking at

these observables, in addition to photometry, is that each one probes a different physical process and different disk regions.

15. The characterization of the Zernike modes at the focal plane for Extremely Large Telescopes projects.

M. A. Leigui de Oliveira (UFABC); J. P. S. Gabriel (UFABC)

The proposed Extremely Large Telescopes (ELTs, including the E-ELT, GMT, and TMT) are limited by optical distortions introduced by the Earth's atmosphere. These distortions will be partially compensated by the use of Adaptive Optics (AO), optomechanical systems that can measure the incoming wavefronts of light from celestial objects and rapidly apply an appropriate optical correction using active optical elements, typically deformable mirrors. In this work, we will report the results of the characterization of the science point spread function and for the photon count rates at the focal-plane wavefront images given by different Zernike modes.

16. Identification of satellite galaxies with S-PLUS

E. V. R. Lima (IAG/USP); M. V. C. Duarte (IAG/USP); L. Sodré Jr. (IAG/USP)

The population of satellite galaxies today stands for one of the challenges of the standard cosmological model, which estimates (by cosmological simulations) a population of this kind of galaxy way higher than what we observe today. The objective of this work is to identify satellite galaxies of nearby galaxies by determining photometric redshifts of the ultra-compact dwarfs and low superficial brightness galaxies, using artificial neural network algorithms on the S-PLUS data. This kind of information will also be used to find these objects around nearby galaxies observed, afterwards, with J-PAS and J-PLUS.

17. G-CLEF Fiber Ratio Degradation Experiment Adaptive Optics Impacts: First Measurements

H. Lupinari (IAG/USP); S. Eikenberry (UF); C. Mendes de Oliveira (IAG/USP)

The goal of this experiment is to measure the focal ratio degradation of the optical fiber that will be used in the GMT instrument G-CLEF, finding the profile of the fiber, a relation between power and output beam aperture, to test the efficiency of the fiber. The ultimate goal is to investigate the capability of G-CLEF as an Adaptive Optics (AO) Instrument. This project presents the fist measurements done with our bench experiment in the IAG optical lab using the actual G-CLEF's fibers.

18. The origin of the wind from black holes

D.May (IAG/USP); J.E.Steiner (IAG/USP)

Cover a high pressure garden hose with a finger and try to sweep out a bunch of beans spread over the floor. The maximum you get is a tiny hole along the water jet. Now, put a hard surface on the way and see an entirely different story. A leading role about supermassive black holes is precisely to blown out and heat the gas in- and outside its galaxy. However, the mechanisms capable to do that, like winds and jets, fail to explain how they have its energy coupled to the surrounding gas in the galactic nucleus. Here we propose an additional process to solve this puzzle: the hard spot on the way of the water beam would play the role of a dense cloud impacted by the black hole's jet. At this stage, the huge amount of kinetic energy concentrated in a narrow open angle of the jet is re-distributed in a wider way by means of a thermal wind, far away from the centre. We strengthen the alliance between 7the next big size mirrors and the methodology to analyze data cubes.

19. Double Nuclei in NGC 908 and NGC 1187

R. B. Menezes (IAG/USP); J. E. Steiner (IAG/USP)

We analyze optical data cubes of the nuclear regions of two late-type galaxies, NGC 908 and NGC 1187, obtained with the GMOS/IFU. Both data cubes show stellar structures consistent with double nuclei. The morphology of the line-emitting areas in the central region of NGC 1187 is also of a double nucleus, while the spatial morphology of the line--emitting areas in the data cube of NGC 908 is consistent with a circumnuclear asymmetric ring. The differences in the properties of the stellar populations detected in the stellar nuclei of NGC 908 indicate that the most likely scenario to explain this double stellar nucleus involves a minor merger. On the other hand, the similar properties of the stellar populations in the stellar nuclei of NGC 1187, together with the probable gas and stellar nuclear rotating disk in this galaxy, suggest that the most likely scenario to explain the double stellar and gas nucleus in this galaxy involves an eccentric stellar and gas rotating nuclear disk.

20. Volatile Organic Compounds stability at exoplanetary atmospheres

T. Monfredini (LNLS/CNPEM); W. Wolf (IF/UFRJ); M. G. P. Homem (IF/UFSC); W. R. Araujo ; M. B. Errada (LNLS/CNPEM); H. M. Boechat-Roberty (OV/UFRJ); D. Galante (LNLS/CNPEM)

Species such as toluene and terpenoids are abundant volatile organic compounds (VOCs). They are emitted in significant amount by trees and other vegetations. So, the emission of biogenic VOCs can play an important role in the photophysics and photochemistry of the atmosphere, affecting the oxidative capacity of the atmosphere. To understand the molecular photostability of VOCs we have measured the absolute photoionizing cross-section of these molecules, using an ionizing chamber and ion-trap spectrometer, with UV and EUV radiation (3-300 eV) from the Toroidal Grating Monochromator (TGM) beamline of the Brazilian Synchrotron Light Laboratory (LNLS). The ionizing chamber has four ion-collectors, two guard-electrodes, a repeller and a pair of secondary electron deflectors in a cylindrical symmetry. In our prelimina-

ry results, we have determined photoionizing cross-section of isoprene and toluene. The photofragmentation of toluene produces higher rates of double ionized fragments.

21. A study of likeness: the solar twin 18 Sco and the Sun

G. Ponte (OV/UFRJ); G. F. Porto de Mello (OV/UFRJ)

The detailed study of solar twins has direct applications both in the understanding of the chemical evolution of the Galaxy and in the evolution of the properties of the Sun over time, besides being a powerful tool in the study of exoplanetary systems. Due to their characteristics similar to solar, the detailed spectroscopic analysis of these stars becomes less dependent on the uncertainties present in the modeling of theoretical parameters, maximizing small spectral differences and making it possible to detail features of distinction or similarity. The objective of this work is to make a direct empirical comparison between the solar twin 18 Sco and the Sun. Using spectra of high signal to noise ratio, high resolution and wide spectral coverage (FEROS/ESO, R=48000, 4500 to 6850 Å), we evaluate how the impact of different sources of error in the analysis (normalization errors, photonic noise, instrument stability and use of different objects as sources of the solar spectrum) can influence the classification of a particular star as a solar twin. We report preliminary results of the analysis of careful manual measures of FWHM (full width half maximum), line depth and equivalent widths in alpha elements lines, iron peak and s-process: Ca I, Co I, Cr I, Cr II, Fe I, Fe II, Mn I, Ni I, Sc I, Sc II, Ti I, Ti II, YI, and Y II. Another aspect of the work is to analyze the dependence of line depth differences with their respective excitation potentials (Meléndez et al, 2006) applied to the new twins HD 150248 and HD 164595 proposed by Porto de Mello et al, 2014. This approach allows us to map some of the sources of uncertainties and degrees of subjectivity involved in determinations of spectroscopic similarity between the twins stars.

22. Chemical analysis of eight giant stars of the globular cluster NGC 6366

A. Puls (UFRGS); B. Alves-Brito (UFRGS)

The metal-rich Galactic globular cluster NGC 6366 is the fifth closest to the Sun. Its kinematics suggests a link to the halo, but its metallicity indicates otherwise. We present a detailed chemical analysis of eight giant stars of NGC 6366, using high resolution and high quality spectra (R > 40000, S/N > 60) obtained at the VLT and CFHT telescopes. The atmospheric parameters were derived using the method of excitation and ionization equilibrium of Fe I and Fe II lines and from those atmospheric parameters we calculated the abundances for other elements and found that none of the elements measured presents star-to-star variation greater than the uncertainties. We determined a mean [Fe/H] = -0.60 +- 0.03 for NGC 6366 and found some similarity of this object with M 71, another inner halo globular cluster. The Na-O anticorrelation extension is short and no star-to-star variation in Al is found. The presence of second generation stars is not evident in NGC 6366.

23. The Be star α Col: a laboratory for the physics of circunstellar disks

A. Rubio (IAG/USP); A. C. Carciofi (IAG/USP); B. M. Mota (IAG/USP), R. G. Vieira (IAG/USP)

Be stars are fast rotating, main sequence B stars that present a Keplerian decretion disk that causes excess emission of neutral hydrogen, among other changes in the spectrum. The model that best describes the physics of Be disks is the Viscous Decretion Disk model (VDD). In the VDD model, some mechanism accelerates stellar material so that it leaves the star and enters orbit. From this point onwards, turbulent viscosity redistributes the material, building the Be disk. In order to test the VDD, multi-technique and multi-spectral modeling of stable Be stars have been made in the past decade, all with positive results. These works model stellar and disk parameters separately for each type of observation. In this work, we take the test one step further, simultaneously fitting all observables to a grid of HDUST models, using a Monte Carlo Markov Chain method. We present here our first results for the stable Be star α Col.

24. Hydrodynamic simulations of galaxy evolution in the cluster environment

R. Ruggiero (IAG/USP); G. B. Lima Neto (IAG/USP); R. Teyssier (Univ. Zurich)

We'll present recent results extracted from idealized simulations of galaxies falling into galaxy clusters, run with the AMR code RAMSES and including detailed gas physics. In particular, we'll show the color evolution of a sample of galaxies after crossing a galaxy cluster once, and describe the population of clouds of molecular gas they leave behind lurking in the ICM for hundreds of Myr. We'll also show constraints on the final state of a Milky Way-like galaxy after crossing a galaxy cluster once, which we find that is never completely stripped except in the special case where it crosses a cool-core.

25. The relation between dust amount and galaxy mass across the cosmic time

J. H. B.Santos (IAG-USP); G. B. Lima Neto (IAG-USP)

Dust strongly absorbs the UV and re-emits as thermal IR, causing profound effects in the SED and extinction curve of galaxies. Even a low dust-to-gas ratio results in significant attenuation of the UV field, leading to the largest source of systematic error in the estimation of star formation rate. In the peak epoch of star formation, $z \sim $ 2.5, the more massive star forming galaxies are obscured by dust. However, in low mass galaxies the major part of the star formation could be unobscured. We investigate the effects of galaxy mass in the dust-to-gas ratio and evolution of dust amount in star forming galaxies. We used the chemodynamic model from Friaça & Terlevich (1998) to simulate galaxies with initial gas mass 5×107 M⊙ < M < 2×1012 M⊙. We noticed that massive galaxies are more efficient to maintain the dust amount for longer time periods, because less massive galaxies lost their dust in outflows generated by supernova feedbacks.

26. Globular Clusters in MASSIVE Galaxies

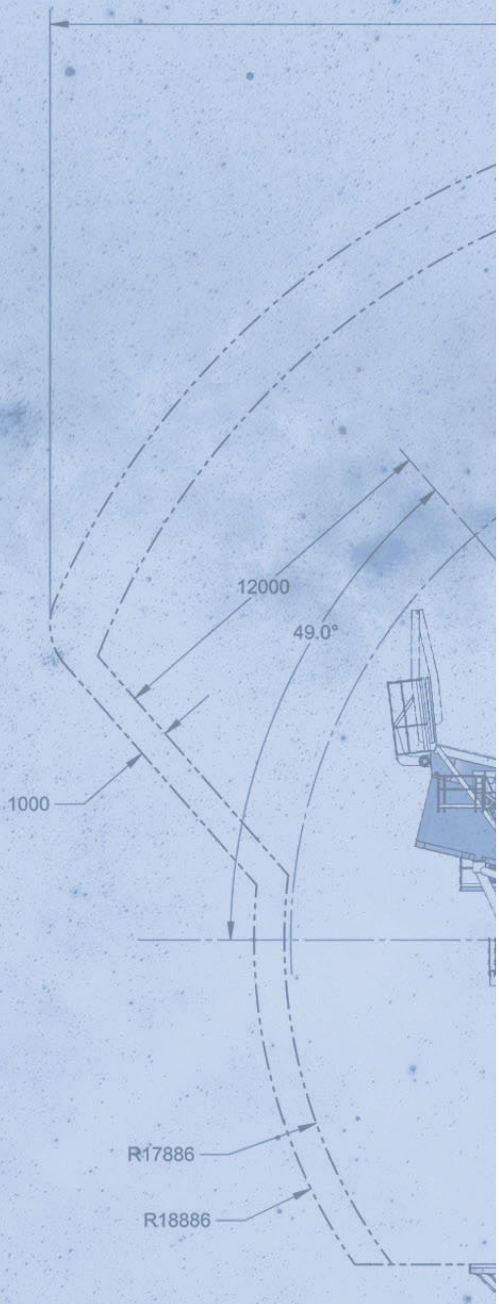
S. A. Villa (UFRGS); A. Chies-Santos (UFRGS); C. Bonatto (UFRGS); J. Blakeslee (Gemini)

Globular clusters (GCs) are bright objects found in luminous galaxies that have the potential to be used as proxies for the build up of their hosts. As such they are useful in our understanding of galaxy formation and evolution. This work presents the study of four elliptical galaxies in the MASSIVE (Ma et al. 2014) Survey (NGC5322, NGC5353, NGC5557 and NGC7619). We have obtained g and i GMOS imaging with the Gemini North telescope as well as F125W with the WFC3 on board of HST. Here, we present the search for GCs and ultra compact dwarf galaxies using Pyraf and SExtractor. We analyse the colour-magnitute and colour-colour diagrams to derive age and metallicity estimates.

27. Probing GPU Computing for Fitting Galaxy Shapes

A. Z. Vitorelli (IAG/USP); T. C. Martins (EP/USP); E. S. Cypriano (IAG/USP)

The goal of this project is to study the ability of General Programing in GPUs to fit profiles to galaxy and point sources, extracting shape information in a parallel fashion. Since the problem is parallelizable both per object (since they are independent) and per pixel (the difference between model and value), there must be expressive performance gains against traditional CPU computing. In a future dominated by large datasets, computational performance becomes an essential feature in data analysis. Initially, this project is focused in implementing known techniques in galaxy shape measurement for weak lensing in GPU architecture, but it intends to work as a flexible framework to which galaxy morphology and other image analysis algorithms can be built upon.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