Estrela D'alva
The Morning Star

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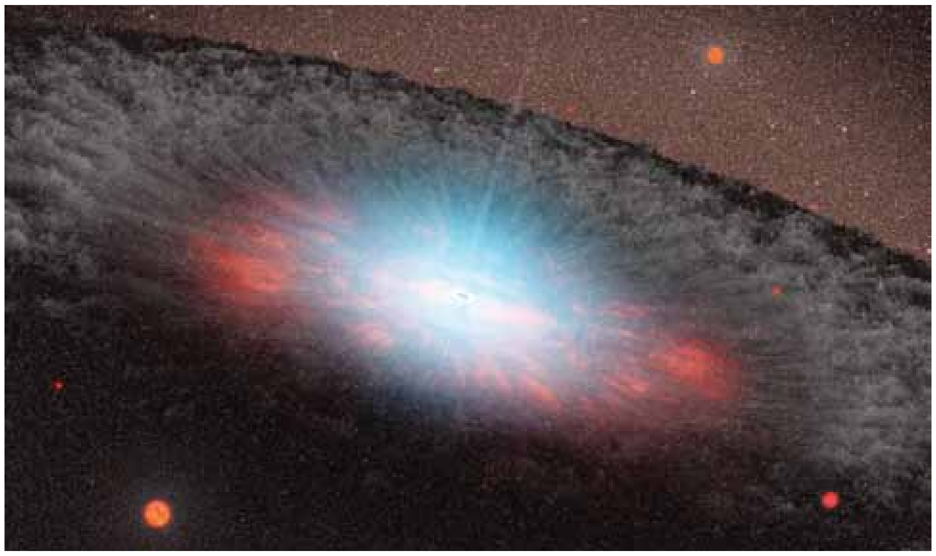
Co-Evolution of Central Black Holes and Galaxies



A current theme in extragalactic astronomy is that not only are quasars tracers of the evolution of galaxies, they are agents of that evolution – the hypothesis is that it is energetic "feedback" from the active nucleus that determines the physical state of the interstellar medium of the host galaxy and thus the star formation rate. The emerging scenario is one where the central black holes in galaxies grow by accretion during a quasar-like phase. But the accretion process itself eventually produces energetic feedback in the form of intense radiation, mass outflows, and jets, that heat up and can even remove entirely the interstellar medium from the host galaxy, effectively shutting down star formation. This intense feedback leaves behind a galaxy that is "red and dead" with a massive central black hole.

It is hypothesized that the ability of an active nucleus to suppress star formation is achieved once the black hole reaches a luminosity that depends on the mass of the host system, thus accounting for the surprisingly tight correlations between the black hole mass and large-scale properties of the host, specifically the luminosity or mass of the bulge component and the bulge velocity dispersion. These correlations appear to hold for both active and non-active nuclei, and provide the underpinning for the feeding-and-feedback picture.

IAU Symposium 267 on the "Co-Evolution of Central Black Holes and Galaxies" is a broad attempt to assess and articulate the observational and theoretical state of what is a rapidly developing and exceedingly complex field. Questions to be addressed include: when did the first supermassive black holes appear? How accurate are the various direct and indirect methods of black hole mass measurement? What is the local black hole mass function, and how does it vary with time? How well-correlated are the masses of the central black hole masses with larger-scale properties of the host galaxies and how do these relationships evolve over time? What is the fundamental physical cause of these relationships? What is the evidence that various agents – radiation, mass outflows, relativistic jets – play a role in suppressing star formation in quasar hosts?

The Symposium is intended to define the state-of-the-art in all of these endeavors, from the details to effects on the largest scales.

Bradley Peterson

The 10-meter South Pole Telescope.

Astronomy in Antarctica

The Antarctic continent is full of promises for astronomers. In spite of its inhospitable environment, the conditions are very good for observations. Right now, most of the work has been to determine the actual conditions of promising sites. Even so, there's a lot of solid research being conducted, making it to the pages of prestigious journal.

One such example is the BOOMERanG balloon experiment, which was able to determine, from measurements of the CMB radiation, that the Universe is flat. And much more is expected in this field. A new experiment called BICEP, started in 2005, is making accurate measurements of CMB radiation. Its effort is aimed at detecting, or at the very least, constraining, the marks left by gravitational waves from the inflationary phase of the Universe – a confirmation sorely needed to definitely validate the ideas behind inflation.

Also, the 10-meter South Pole Telescope is aimed at CMB. It is located at the Amundsen-Scott Station. So is the Icecube neutrino observatory, a facility for the study of neutrino emissions.

Right now, a committee is putting together a network of collaborations whose purpose is to foster astronomy in Antarctica, suggesting to the governments responsible for the infra-structure which large-scale projects should be pursued.

Salvador Nogueira

Brazilian Optical Astronomy Facilities

Composition with Gemini, SOAR and Pico dos Dias Observatories | Bruno Castilho LNA

Looking at the official poster of this General Assembly, the reader might wonder about the telescope building depicted beneath the contours of Rio's Sugar Loaf Mountain. It is not one of the major facilities on Earth, nor is it in the host country. So what is it and why did the Organizing Committee choose it as such a prominent feature on the poster?

The building, located on Cerro Pachon, Chile, hosts the 4.1m aperture SOAR Telescope (Southern Telescope for Astrophysical Research). Operated jointly by NOAO, University of North Carolina, Michigan State University and the Brazilian National Laboratory for Astrophysics (LNA), SOAR constitutes the most important element of a suite of facilities for optical and infra-red astronomy open to the entire Brazilian astronomical community.

It all began with the construction, in the 70s of the past century, of a 1.6-m aperture telescope for the Pico dos Dias Observatory (OPD). Complemented later by two smaller telescopes, OPD offered to the national community for the first time guaranteed access to internationally competitive observing facilities and thus fostered an enormous growth of astronomy in Brazil. Consequently, very soon OPD could no longer satisfy the growing demand for telescope time, neither in terms of quantity (number of observing nights) nor in quality (need to have access to larger telescopes).

How to solve this problem? Enlarging the facilities at OPD, an admittedly less than ideal place to put a major telescope? The Brazilian astronomers found a better solution: the participation in international observatory projects. Through LNA, which acts as the National Office, they associated themselves first with the Gemini Observatory. This satisfied the demand for quality. As a Gemini partner Brazil has access to one of the largest, most modern and most competitive observatories currently operational. Moreover, observational astronomical research in Brazil was no longer restricted to the Southern Hemisphere once astronomers can use both, Gemini South and North. But there is a drawback. The small 2.5% share of Brazil is not sufficient of meet the demand in quantity.

Therefore, Brazil, together with the partners already mentioned, engaged in building the SOAR telescope, of which it holds the majority share. Although somewhat smaller than the Gemini, and still ramping up as a well functioning observatory, the superb optical quality of the telescope and the ample access it offers is quickly turning SOAR into the most important observing facility for the Brazilian community.

Since both, Gemini and SOAR, have small fields of view, and thus do not meet the demands of that fraction of the community which needs wider fields (although through SOAR they also have access to the wide field Blanco Telescope on CTIO Observatory), LNA entered more recently into a cooperation with the Canada-France-Hawaii Telescope (CFHT) on Mauna Kea which now opened its superb facilities for wide field astronomy also to Brazilian astronomers.

Fulfilling its mission to provide astronomical infrastructure to the Brazilian scientific community, LNA thus offers to its users a wide variety of facilities, ranging from the small and medium-sized telescopes of OPD, encompassing the 4m class telescopes CFHT and SOAR (and indirectly also Blanco), and culminating in the large Gemini telescopes. Mission accomplished? LNA will go on improving its services!

Albert Bruch

Is the current **refereeing system** adequate?

Nearly all of us have suffered from a journal referee who was misinformed, obstinate, unprofessional, or all of the above! Such are the liabilities of a system in which a single, often anonymous, referee has such a strong voice in the publication of your research. In many other fields, such as the biosciences, multiple referees are the norm, and this practice greatly improves the "signal to noise" of the peer review process. However, the publishing cultures in those professions are different from ours in other respects, with rejection rates of 80-95% (the reverse of the accept/reject rates of most major astronomy journals), much shorter papers, and fewer of them written. If we were to adopt a 3- or 5-referee system in astronomy, the costs in money and time would be prohibitive, and who would be willing to referee so many papers? Like it or not, the single-reviewer practice is inextricably woven into other facets of our publishing culture.

If we reluctantly accept that reality, is there anything we can do to improve the quality and efficiency of the refereeing system? I believe we can. An informed and engaged editor can exert enormous influence, by offering a guiding hand and intervening when a peer review gets out of hand. Unfortunately, in today's age of point-and-click electronic peer review, it has become all too easy for many editors to shirk their core responsibility to moderate the scientific exchange in a peer review, and instead to become little more than mailing services for referees and authors. We might benefit from a return to Chandrasekhar's more engaged approach.

A more difficult question, about which many will disagree, is whether the problem today is too few papers accepted or too many? From where I stand I am increasingly distressed by the pressure placed on many astronomers, young scientists in particular, to publish reams of papers regardless of quality, simply to document productivity. We risk being drowned in a sea of potentially useful but marginally significant papers, when we could all benefit from the time to slow down and produce a few deeper, well thought out publications. Stricter refereeing could help to bring that about, but are we ready to reform ourselves?

Robert C. Kennicutt

Star Clusters: Basic Galactic Building Blocks

Almost all stars and their planetary systems form in star clusters. Because of the proximity of stars to each other, every star in a cluster will have significant effects on almost every other star, and will be affected by almost all other stars in turn. Star clusters span a huge range of sizes, from small associations of a few hundred stars, via "typical" clusters like the Orion Nebula Cluster, to extremely massive globular and "super" star clusters. The latter are the most massive star clusters known; they are the hallmarks of massive starbursts in their host galaxies.

Stars form from their natal molecular clouds in binary and multiple systems. These systems are initially so close that they interact, destroying some multiple systems and swapping partners in others. The most massive stars become supernovae, blasting away the gas left over after star formation, and causing the cluster to expand. Many clusters do not survive this expansion and are destroyed, but those that do survive may last long enough to become counterparts of the old globular clusters observed in large numbers in the local Universe. Globular clusters, the oldest galactic building blocks, are thought to be fossil tracers of violent episodes during the galaxy formation process. They provide crucial information about the oldest phases of stellar evolution (and reveal puzzling clues in terms of abundance anomalies and spreads, and hitherto unexpected multiple epochs of star formation), as well as regarding their wider environmental impact and context.

Given the wide range of scientific topics covered by star cluster research, from stellar evolution on the smallest to cosmological implications on the largest scales, Symposium 266 offers sessions of interest to the majority of researchers in astrophysics. We therefore particularly encourage you to attend the Symposium's keynote lecture by Bruce Elmegreen (Tuesday, August 11 at 09:00).

Jacques Lepine and **Richard de Grijs**

Connecting First Stars to Planets

Cosmic chemistry is a rich and evolving field of astronomy, driven by the increasingly powerful observational capabilities on large telescopes coupled with major advances in modelling stellar atmospheres and improved access to large and accurate nuclear, atomic, and molecular databases. IAU Symposium 265: "Chemical Abundances in the Universe: Connecting First Stars to Planets" aims to provide a broad overview of the production and evolution of chemical elements over cosmic time and how this chemical evolution connects the early universe of metal-free and heavy-element poor first generations of stars, through the formation of galaxies, with their diverse stellar populations, to a universe of heavy-element rich stars and planets.

In recent years, the connections between seemingly different areas have become clearer: the first generation of massive stars drives the era of reionization, and is associated with long duration Gamma-Ray bursts (GRBs). The oldest low mass stars, which are still observable today, were chemically imprinted with the nucleosynthetic products from the energetic events driven by these first massive stars. The Chemical abundances of QSO absorption lines and damped Lyman-alpha systems as a function of redshift can be connected to the abundances of stars as a function of metallicity to provide a view of chemical evolution in the Universe during the first Gyr of its existence. In our Galaxy, chemical abundances in stars from different populations and distinct locations in the Galaxy provide important constraints to our current understanding of the formation and assembly of the Milky Way as an increasingly larger number of stars in the Bulge, disk and halo are scrutinized for abundance patterns of crucial elements which are formed in a variety of astrophysical sites.

The sessions and broad themes which are covered in the IAU Symposium 265 program begin in the early universe with Big Bang Nucleosynthesis, then follow the evolution of the elements to the present epoch, providing a setting on which a current picture of the chemical structure of the universe can be built. The closing session looks to the future in order to frame a set of questions which will help define the next generation of instruments on the extremely large telescopes.

Check out our program and awesome speakers at http://www.on.br/iau-s265/dates.html. We welcome you to IAU Symposium 265 and look forward to bringing you exciting results!

Katia Cunha, Monique Spite and **Beatriz Barbuy**

A window of opportunity for South American Astronomy

The possibility of installing two radio telescopes for millimeter and sub-millimeter wavelengths, in the Argentinean side of the Atacama desert at distances of 180-210 km from Chajnantor (the site of ALMA), and altitudes greater than 4700 meters, has been discussed among astronomers of Argentina and Brazil.

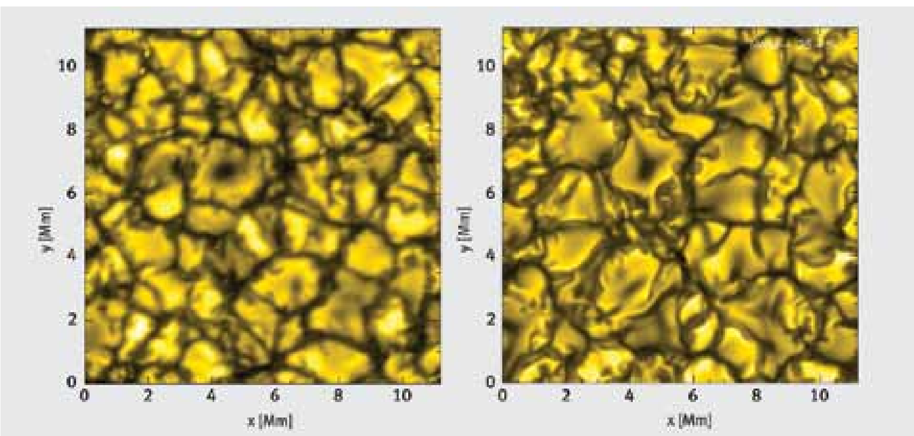
The support to this idea has been ratified in September 2008 by the Argentinean Astronomical Assembly. In Brazil it is being studied as one of the possible key science goals of the recently approved Astrophysics National Science Institute by the Brazilian National Council of Research - CNPq. Top authorities of Science and Technology in Argentina informed that in the context of regional integration, funds may be available for original projects on basic sciences, with technology transfer components.

The initial US$ 20 million investment of LLAMA would allow Argentine and Brazilian scientists to develop millimeter and sub-millimeter single dish radio astronomy, as well as integration in global experiments with Very Long Baseline Interferometer networks. Of particular interest may be VLBI with already existing radio telescopes in Chajnantor (APEX and ASTE), and in the long run with elements of the ALMA array. Site testing in Argentina has been carried out for three years in Macón (4600m, 180km SE of ALMA) with equipment provided by UNAM (México), and further site testing started at other site 180 km SE of Chajnantor (see attached map). A proposal for initial funding to carry on the in depth study of this project will be submitted by December 2009.

We invite you for an open meeting on this project that will take place on Tuesday August 11 at 17:30 in room 2.11.

I.F. Mirabel, M. Arnal, R. Morras, G. Romero, J. Lepine, Z. Abraham, El. M. de Gouveira Dal Pino

Location of Chajnantor, Macón and Chorrillos. The yellow line shows the border between Argentina and Chile, the black line the railway track Salta-Antofagasta.



Left: Quiet solar granulation as observed with the 1m Swedish Solar Telescope (courtesy Mats Carlsson 2004). Right: High-resolution simulation of solar surface convection (courtesy Matthias Steffen 2009).

US Navy **CCD Astrograph Catalog** release

Related talks will be presented in session 2 and 4 in room 2.8.

Today, the long wait is over. The 3rd data release of the US Naval Observatory CCD Astrograph Catalog (UCAC3) will be announced at the Commission 8 meeting. UCAC3 is an all-sky astrometric star catalog covering the 8 to 16 magnitude range, using observations made in a single bandpass (between V and R). For stars in the 10 to 14 mag range 15 to 20 mas positional accuracy is achieved, with increased error to about 100 mas at the faint limiting magnitude.

UCAC3 contains 100.7 million objects. Proper motions are provided for about 95 million objects and B,R,I photometry from the SuperCosmos source catalog has been added as well as J,H, and Ks data from the 2MASS project. The 8 GB of data are released on a DVD, and will also become available from the data centers shortly. For details, visit http://www.usno.navy.mil/usno/astrometry.

Norbert Zacharias

3D views on cool stellar atmospheres

Much of what we know about the chemical composition of the Universe is actually stemming from the chemical composition of stars, which is often deciphered from the spectra emerging from their atmospheres. Cool, low-mass and long-living stars allow to study the evolution of the Universe's chemistry from a time shortly after the big bang until today.

The observation and interpretation of stellar spectra is a classical field in astronomy but is still undergoing vivid developments. The enormous increase in available computational resources opened up possibilities which led to a revolution in the degree of realism to which modelists can mimic nature. High-resolution, high-stability, high-efficiency spectrographs are now routinely providing stellar spectra whose full information content can only be exploited if a very much refined description of a stellar atmosphere is at hand.

This situation motivated Commission 36 "Theory of stellar atmospheres" to organize an exchange of latest views on the atmospheres of cool stars, and their inherent complexities related to multi-D hydrodynamics and magnetic fields.

The recent downward revision of the solar photospheric CNO abundances, and questions about the robustness of measurements of the Li6 isotope in metal-poor halo stars will certainly fuel lively debates among the theoretically inclined participants, with repercussions on fields far beyond stellar atmospheres as such.

We also expect to discuss exciting new observational views, ranging from HINODE looking at the Sun to cloud formation and their dynamics in the atmospheres of brown dwarfs and planets. Last but not least, polarimetry and interferometry provides new perspectives for which JD10 is going to serve as a discussion forum.

Hans-G. Ludwig