A AURORA DA ASTROFÍSICA ÓTICA BRASILEIRA (VINTE E CINCO ANOS DA PRIMEIRA LUZ DO TELESCÓPIO DE 1.6M DO OPD)

Carlos Alberto Torres
LNA

A história do projeto "Observatório Astrofísico Brasileiro (OAB)", é apresentada, em depoimento e análise pessoais, desde as dificuldades para se implantar a Astrofísica em república positivista, passando pelas dificuldades humanas e práticas da escolha de sítio na década de 60, até os primeiros problemas operacionais, vindos das diferentes concepções sobre o significado do projeto e que resultariam na criação do LNA. São ressaltadas as contribuições de astrônomos essenciais para a realização do projeto (em ordem histórica): Domingos Costa, Muniz Barreto, Abraão de Morais, Sylvio Ferraz Melo, Lício da Silva e Germano Quast e a importância do grupo de Belo Horizonte na viabilização da escolha de sítio. O projeto OAB foi, da concepção à realização, nacional e supra-institucional cujo impacto, da escolha de sítio à operação do Observatório do Pico dos Dias, permitiu a implatação e o grande crescimento da Astrofísica Ótica no Brasil.

THE SQUARE KILOMETER ARRAY (SKA)

Richard Schilizzi
International Project Director
Square Kilometer Array, Dwingeloo, The Netherlands

The Square Kilometre Array (SKA) is a global project to design and build a new generation radio telescope at metre to centimetre wavelengths. It will have a collecting area of order one million square metres spread over at least 3000 km, a sensitivity 100 times higher than the current most sensitive interferometer, an instantaneous field of view (FOV) of at least 1 square degree and, in some designs, more than one FOV allowing multiple simultaneous use. It will be an extremely powerful survey telescope with the capability to follow up individual objects with high angular and time resolution.The SKA science impact will be felt in astro-particle physics and cosmology, fundamental physics, galactic and extragalactic astronomy, and solar system science. Technological innovation, closely paralleling commercial IT developments, is key to the design concepts under investigation and to the cost goal of 1000 Euro/m2. Data transport rates are likely to be in the range of tera-bits/sec, with Pflops capacity required for the central processor. The selection of technologies for the SKA is scheduled in early 2009. A number of possible locations for the telescope are under investigation with a choice scheduled in late 2006. Construction of the array will take most of the next decade.

1905 – O ANO MIRACULOSO DE EINSTEIN

Ildeu de Castro Moreira
Instituto de Física, Universidade Federal do Rio de Janeiro

Há 100 anos, um jovem físico, trabalhando como técnico de terceira classe em um escritório de patentes em Berna (Suíça), publicou cinco trabalhos. Todos de excelente qualidade. Dois deles mostrariam, com base em teorias simples e elegantes, como poderia ser demonstrada experimentalmente a realidade física de átomos e moléculas, assunto ainda controverso no início do século passado. Poucos anos depois, graças a essas idéias, a teoria atômica receberia sua consagração final, suplantando as dúvidas de seus mais ferrenhos opositores. Os três artigos restantes alteraram profundamente a face da física moderna. No primeiro a ser concluído naquele ano, o jovem rebelde e contestador propôs o que mais tarde ele classificaria como a idéia mais revolucionária de sua vida: a luz, sob certos aspectos, apresenta uma natureza granular. Em junho e setembro, concluiu os dois últimos artigos de 1905 e aos quais seu nome estaria associado para sempre. Eles, em conjunto, dariam origem à teoria da relatividade, que destruiria o caráter absoluto atribuído, durante séculos, ao tempo e ao espaço. Seu nome: Albert Einstein.

STATUS OF SOAR AND FIRST SCIENCE

S.O. Kepler
IF/UFRGS & SOAR Telescope

The SOuthern Astrophysical Research telescope is a 4.1m alt-az optical telescope built in a collaboration between CNPq/MCT-Brazil, NOAO, UNC and MSU, from the US, to operate with live optical and near-IR imagers and spectrographs, from the atmospheric cutoff at 3200 Å to 2.5 μ. It is located in Cerro Pachon, in Chile. Its primary mirror is only 10~cm thick, and is supported by 120 electro-mechanical actuators, to set and hold its optimum shape. The tertiary mirror will partially correct the atmospheric turbulence by tip-tilting at 50 Hz, to achieve the designed image quality of 0.22 arcsec. Its first light was achieved in April 2004, but it is still under commissioning to achieve its designed superb image quality. Commissioning of the 4096x4096 optical imager started in Dec 2005 and was used in March 2005 to find two new pulsating white dwarfs, in Early Science. We will report on the status of the image quality and commissioning of all instruments.

SCIENCE AND TECHNOLOGY OF A 100 M TELESCOPE: ESO'S OWL CONCEPT

Roberto Gilmozzi
Director of ESO's VLT Observatory, Cerro Paranal

The history of the telescope has been dominated by a factor-of-two increase in diameter every ~ 40 years. In the 20th century the increase in sensitivity has been much larger than this trend, having gone from eye measurements to photographic plates with efficiencies of a few percent to modern detectors approaching 100% efficiencies. To maintain this progression in sensitivity, the next generation telescope will need to be 6 to 10 times larger than the present ones. The science case underlying the future telescopes also shows that the requirements to obtain spectroscopic observations of extrasolar earth-like planets; to study the stellar populations in elliptical galaxies; and to search for the building blocks of galaxies and the first stars, drive the dimension of the telescope to sizes between 80 and 100m. The possibility of a physics-like experiment to measure directly the acceleration (or deceleration) of the expansion rate of the universe is also opened by the enormous collecting power of telescopes of 100m or more. I will present the results of the concept study ESO is conducting on a 100m telescope dubbed OWL (for its keen night vision and for being Over Whelmingly Large) and report on the status of various industrial studies supporting both the feasibility and the cost estimates of OWL. The design relies on serialized production of optical, mechanical, electromechanical elements to break the traditional cost law of telescopes. This has led to the choice of a spherical primary and flat secondary as basic design, which has allowed also to reduce by a factor of almost 1000 the mechanical constraints on optical alignment.

COSMIC MAGNETIC FIELDS

Elisabete M. de Gouveia Dal Pino
IAG/USP

Few decades ago magnetic fields were in general regarded as unimportant. Only a few scientists, like Alfvén, Biermann, Chandrasekhar, and Parker, realized the potential role of the magnetism in the Universe. Since then, our view has changed considerably. We know now that most of the visible matter in the Universe is in a plasma state, or more specifically is composed of ionized or partially ionized gas permeated by magnetic fields. Thanks to recent advances on the theory and detection of cosmic magnetic fields there has been a worldwide growing interest in the study of their role on the formation of astrophysical sources and the structuring of the Universe. There seems to be now no doubt that *magnetic fields are crucial* in: star formation, solar and stellar activity, pulsars, accretion disks, formation and stability of jets, formation and propagation of cosmic rays, and stability of galactic disks. They are also *probably crucial* in: the insterstellar medium, molecular clouds, supernova remnants, proto-planetary disks, and planetary nebulae, but its importance is still not well understood in: stellar evolution, halos of galaxies, galaxy evolution, and structure formation in the early Universe. In this talk, I will try to review the importance of the cosmic magnetic fields both from a theoretical and from an observational perspective. Cosmic magnetism is one of the key science projects in the next generation radio telescope Square-Kilometer-Array (SKA) and, as a matter of fact, all future telescopes should be designed to allow for magnetic field polarization measurements.

INSTRUMENTAÇÃO PARA O TELESCÓPIO GEMINI

Cláudia Mendes de Oliveira
IAG/USP

Apresentaremos as principais características dos instrumentos a serem utilizados nos telescópios Gemini nos próximos 5 a 7 anos. Discutiremos sobre o modo de utilização destes instrumentos, particularmente sobre a idéia de usa-los em modo campanha. Esperamos ter ampla discussão da comunidade sobre vários assuntos relacionados ao uso dos telescópios e instrumentos.

SIMULATING STELLAR PHOTOMETRIC SURVEYS WITH THE TRILEGAL CODE

Leo Girardi
Osservatorio Astronomico di Trieste

We describe TRILEGAL, a new populations synthesis code for simulating the stellar photometry of any Galaxy field, including nearby Local Group galaxies. The code attempts to improve upon several technical aspects of star count models, and has proven to be successful in reproducing the Galactic data from very shallow (Hipparcos, 2MASS) to very deep photometric surveys (EIS-deep, DMS). The code is ready to face new challenges set by present-day public archives, like the use of special or newly-designed filter sets (e.g. SDSS, ACS, OGLE), the observation of detailed and complete sequences of evolved stars (e.g. 2MASS and DENIS for the Magellanic Clouds), and the heavy contamination of the dwarf spheroidal data by the foregroung Galaxy (e.g. the Sgr dSph). TRILEG AL is also ready to use for the variety of wide-angle surveys in the optical/infrared that will become available in the coming years.

O SATÉLITE CoRoT: DIA D MENOS UM ANO

Eduardo Janot Pacheco
IAG/USP

Em agosto de 2006, o satélite CoRoT será lançado por um foguete Soyuz de Baikhonur, no Khazakhistão. A astronomia brasileira seguirá a bordo, já que participaremos da missão com direitos iguais aos dos parceiros europeus. Descreveremos o experimento, que fará fotometria de regiões do céu de 3 graus quadrados durante 150 dias ininterruptos e com precisão inédita, o que permitirá alcançar os objetivos do Programa Central: estudos sismológicos de estrelas, sobretudo de tipo solar e descoberta de planetas pelo método dos trânsitos. No primeiro caso, poderemos testar os modelos atuais de estrutura e evolução estelar com precisão jamais alcançada e estudar fenômenos ligados à rotação e atividade nas estrelas. No segundo, descobriremos, pela primeira vez na historia da humanidade, algumas dezenas de planetas rochosos na zona de habitabilidade e centenas de planetas gigantes. Isso permitirá compor-se um cenário muito mais completo sobre a formação e estabilidade dos sistemas planetários. Finalmente, uma grande variedade de fenômenos astrofísicos estelares e não estelares serão estudados nos Programas Adicionais. Essa é a primeira vez em que cientistas e engenheiros brasileiros participam efetivamente de uma missão espacial desde o seu início.