consists essentially in two coded-aperture imaging telescopes equipped with cadmium-zinc-telluride (CZT) solid-state room-temperature semiconductor detectors. One telescope (T1) has been in development at INPE′s Astrophysics Division and will fly in a high altitude (∼43 km) balloon in 2014 for testing and demonstration; this development is called the *protoMIRAX project*. T1 uses an array of 13×13 CZT planar detectors with dimensions 10mm×10mm×2mm and a 1 mm-thick lead coded mask with 20 mm openings in a 13×13 Modified Uniformly Redundant Array (MURA) basic pattern. It will have a $20^\circ \times 20^\circ$ fully-coded field-of-view (FCFOV) and an angular resolution of 1.5°. T1 will be mounted in a balloon gondola with an attitude control and pointing systems as well as a 500 kbps telemetry and command capability for real-time operation and data acquisition. The imaging CZT detectors for the second telescope (T2) are being developed at the Harvard Smithsonian Center for Astrophysics (CfA). The detector plane for T2 will have a 0.6 mm spatial resolution and an area of 250 cm^2. A 0.3mm-thick tungsten mask with a random pattern will provide images with 6′ angular resolution with a $20^\circ \times 20^\circ$ FWHM FOV. In this presentation we will describe the current status of MIRAX and present results of the protoMIRAX detector, telescope and balloon gondola developments.

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GEMS/GSAOI: FROM COMMISSIONING TO OPERATIONS AND SCIENCE RESULTS

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The Gemini Multi-conjugate Adaptive Optics System (GeMS) and the Gemini South Adaptive Optics Imager (GSAOI) are unique and complex facility Gemini instruments. GeMS/GSAOI provide a uniform, diffraction limited image quality at near-infrared (NIR) wavelengths over a field of view of 85" x 85" on the sky. The GeMS/GSAOI commissioning started at the beginning of 2011. After ∼2 years of dedicated work and more than 90 nights of on-sky commissioning, at the end of 2012 GeMS/GSAOI started to produce the first science results. In this presentation we describe in details the system performance, on-sky efficiency and present the scientific results produced by GeMS/GSAOI during the system verification process.

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MMTRON

T. de Graauw[1]

Millimetron is a 10-meter cooled space observatory that is optimized for the far-infrared and submm wavelength range. The facility has two operating modes: one can operate as a single-dish observatory or as an element of a space-earth VLBI system. It will have scientific capabilities that can address various key problems in astronomy and astrophysics such as the formation and evolution of stars and planetary systems, evolution of galaxies, quasars, etc. The telescope will be deployed in space and the panels of the primary mirror are to be adjustable to achieve an rms accuracy less than 10 micron. The telescope and instrument compartment will be cooled down to 4.5K by passive cooling and mechanical coolers. The instrument package is to include a set of heterodyne receivers operating in several bands between from 500 and 5000 GHz, a submm array camera/spectrometer and a mm array camera/spectrometer covering 50 micron to 3 mm. Millimetron is proposed as a Russian-led mission and is to include a wide international collaboration. Currently, the mission scheduled to be launched in 2020.

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SURFACE LAYER TURBULENCE PROFILING WITH THE SL-SLODAR AND LUSCI AT ESO PARANAL OBSERVATORY

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In the context of the Surface Layer investigation at ESO Paranal Observatory, a Surface Layer Slope Detection And Ranging (SL-SLODAR) instrument prototype has been used at Paranal during 2012, while Lunar Scintillometer (LuSci) measurements campaigns are being carried out since 2008. Simultaneous Surface Layer profiling data from the two instruments are analysed in order to compare the two instruments to enforce their reliability and finely characterize the Paranal Surface Layer profile.

BETA is the slope of the turbulence power spectrum delivered by the SL-SLODAR. It is intended purely as a diagnostic tool to indicate whether the Cn2 profile can be trusted. When BETA is significantly less than 3.667 (Kolmogorov law value) this generally indicates that the wind speed is low and the data sets are too short to fully sample the low frequency components of the turbulence. Around the Kolmogorov value, the integrals form the SL-SLODAR and LuSci are pretty much the same. This is valid also in the first 20 m above ground only (SL).

Both instruments agree very well when the wind speed on the Paranal platform is higher than 3 m/s. This last result suggests that wind speed higher than 3 m/s allow to have more reliable turbulence profile measurements from both instruments for further analyses of the Surface Layer. Furthermore, the disagreement of the two instruments in connection with wind speed lower than 3 m/s also suggests that the wind speed is a critical parameter to be taken into account before the treatment of the data.

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SOUTH POL: REVEALING THE POLARIZED SOUTHERN SKY

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SOUTH POL will be a survey of the Southern sky in optical polarized light. It will use a newly designed polarimeter for an 80cm Robotic Telescope. Telescope and polarimeter will be installed at CTIO, Chile. The initial goal is to cover the sky south of declination −15° in about two years of observing time, aiming at a polarimetric accuracy ≤ 0.1% down to V=15, with a camera covering a field of about 2.0 square degrees.

SOUTH POL will impact areas such as Cosmology, Extragalactic Astronomy, Interstellar Medium of the Galaxy and Magellanic Clouds, Star Formation, Stellar Envelopes, Stellar Explosions and Solar System, among others.

The polarimeter is currently being built and its optics and electronics assembled. We will describe the current status of the project.

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IMPROVING INPE′S BALLOON GROUND FACILITIES FOR OPERATION OF THE PROTOMIRAX EXPERIMENT

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The system requirements for reusing the scientific balloon ground facilities available at INPE were a challenge to the ground system engineers involved in the protoMIRAX X-ray astronomy experiment. A significant effort on software updating was required for the balloon ground station. Considering that protoMIRAX is a pathfinder for the MIRAX satellite mission, a ground infrastructure compatible with INPE′s satellite operation approach would be useful and highly recommended to control and monitor the experiment during the balloon flights. This approach will make use of the SATellite Control System (SATCS), a software-based architecture developed at INPE for satellite commanding and monitoring. SATCS complies with particular operational requirements of different satellites by using several customized object-oriented software elements and frameworks. We present the ground solution designed for protoMIRAX operation, the Control and Reception System (CRS). A new server computer, properly configured with Ethernet, has extended the