

² Instituto de Astrofísica, Pontificia Universidad Católica de Chile, Santiago, Chile.

³ Max-Planck-Institut für Astronomie, Heidelberg, Germany.

ATMOSPHERIC TURBULENCE SIMULATIONS WITH SPATIAL LIGHT MODULATORS

R. Bernardi¹, A. Kanaan¹, and A. Mello¹

Atmospheric turbulence in the optical path of incoming stellar light transforms a plane wavefront into a distorted wavefront. This leads to loss of resolution achievable in a telescope. The correction of these distortions is the goal of adaptive optics. We are designing an experiment to recreate the effects of turbulence on an optical bench. This experiment aims to reproduce the effects observed in an artificial sodium laser star when viewed by a 30m class telescope. The edge of such large telescopes see the sodium artificial star as an elongated rather than a circle. In the bench experiment the turbulence distortions are achieved by directing the light beam through a glass plate whose surface is etched to imitate the phase distortions caused by the atmosphere, this plate is called a phase screen. Phase screens are made much bigger than the incident beam of light and we move this phase plate to simulate the effect of a changing atmosphere. To test new turbulence patterns one needs several different phase screens, which are expensive and hard to make. Our work involves computing numerical simulations of turbulence and testing algorithms to correct the phase distortion. We would then like to test these algorithms on our bench before testing on the telescope. To make these tests more realistic we would like to apply the same simulated turbulence patterns to our phase screen. This is almost impossible to do with phase screens, therefore we are planning to replace phase screens with spatial phase modulators that can be programmed to introduce a phase shift to the incident light at a time resolution of milliseconds. Integration of spatial phase modulators in optical benches as phase screens will allow for much more flexible experiments permitting a perfect correlation between the numerical simulations and the physical experiments.

¹ Grupo de Astrofísica, Universidade Federal de Santa Catarina, Campus João David Ferreira Lima, Caixa Postal 476 CEP 88040900, Florianópolis, Santa Catarina, Brasil (rrbernardi@astro.ufsc.br).

EXTINCTION COEFFICIENTS WITH AN ALLSKY CAMERA

G. S. Bortolotto¹, A. Kanaan¹, and D. Walker²

All sky cameras are a great alternative to the study of atmospheric conditions in an astronomical site. We show how to compute the instantaneous coefficients of atmospheric extinction for various moments in the same night. The images used were obtained by the camera SASCA (SOAR AllSky Camera) located at Cerro Pachon. To estimate the extinction coefficients we developed a method to measure the brightness of several stars at different air masses for the same instant. We developed a Python program that calculates azimuth and altitude for the stars and then converts them to pixel coordinates on the CCD. Comparing the positions calculated for a group of stars with their actual positions on the images, we can determine the distortion caused by the camera. After finding out the distortions we know exactly in which pixel a star falls on any date and time. At this point we created tables of star positions and did the photometry of them all on each image using the IRAF routine PHOT. These photometry tables are subsequently converted into multiple tables with apparent magnitude versus air mass for each star at a given instant. Our results show that the extinction coefficient calculated for different atmospheric moments is within two sigma of the values of the coefficients obtained through the monitoring of a single star at different air masses, demonstrating the feasibility of our approach.

¹ Departamento de Física, Universidade Federal de Santa Catarina, Campus Universitário Reitor João David Ferreira Lima, CEP: 88040-900, Florianópolis, Santa Catarina, Brazil (germano@astro.ufsc.br).

² Cerro Tololo International Observatory, La Serena, Chile (dwalker@ctio.noao.edu).

THE HARD X-RAY TELESCOPES FOR MIRAX AND PROTOMIRAX

J. Braga¹, F. D'Amico¹, M. C. Ávila¹, B. H. Rodrigues^{1,2}, J. E. Grindlay², B. Allen², J. Hong², S. Barthelmy³, and R. E. Rothschild⁴

The Monitor e Imageador de Raios X (MIRAX), under development at the National Institute for Space Research (INPE), Brazil, is a hard X-ray astronomy experiment that will be launched in low-Earth orbit (650 km altitude, 15° inclination) on-board the Lattes satellite mission in 2018. MIRAX