CCD INSTRUMENTATION AT CAPILLA PEAK OBSERVATORY

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1. INTRODUCTION

The astronomers at the University of New Mexico are applying the finishing touches to their CCD project. We addressed many issues during the course of this project, such as whether to build or buy the CCD camera system, what upgrades our telescope and observatory were in need of, and what kind of image processing capability the instrument demanded. Our decisions and solutions are presented as a guide to other institutions which may be considering CCD instrumentation for their small telescopes, especially since most face the same constraints that we do: limited money and manpower.

2. CCD SYSTEM

Through visits to the Kitt Peak Station of NOAO, I generated rough estimates of $150,000 and two years of work to fabricate the CCD camera system at UNM. This includes no design work, but simply to "copy" the Kitt Peak System. This estimate is a lower limit and attempts to include all hardware, computers, salaries and shop time. The time estimate is based on one engineer and two technicians working full time. The other option we considered was the "off the shelf" system produced by Photometrics, Ltd. in Tucson. Their cost for the CCD system, excluding the chip, was about $70,000--very near hardware cost. We opted for the Photometrics System, in part because it comes with a complete software package to control the CCD camera and manipulate the images for preliminary processing.

3. REQUIRED UPGRADES FOR OBSERVATORY AND TELESCOPE

We determined as well that our particular observatory and telescope should be upgraded to allow more efficient use of our powerful instrumentation. Thus, the observatory "warm room" was made into a Faraday Cage; the power into the building was shielded with spark gap

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arrestors and a capacitor bank, and the powerline to the CCD computer was put on an Uninterruptible Power Supply system. The 61 cm, Boller & Chivens, f/15.2 telescope has been outfitted with shaft encoders, filter sheel, and offset guiding system, that uses a Fairchild CCD camera and image intensifier still being developed. This ancillary equipment is all computer-controlled from the warm room.

4. IMAGE PROCESSING

The astrophysics group at UNM has purchased an I^2S Model 75 to interface with UNM's research VAX 11-785. We currently have AIPS running on the system. Both the GASP (GAlaxy Surface Photometry) software and a Dunn camera hardcopy unit are now being installed. We considered the development of a complete image processing system for data reduction and analysis to be an integral part of the CCD upgrade.

5. SCIENTIFIC GOALS

The installation of the state-of-the-art CCD instrumentation will usher in a new era for Capilla Peak Observatory. With this CCD camera system we are able to extend our observational capabilities to the realm of extragalactic imaging. Moreover, our capacity to do stellar photometry is not compromised by this new instrument. We are planning to pursue extragalactic survey work on galaxy superclustering and other large scale structure topics. Coincident with this work the stellar photometry research, primarily RS CVn stars, will be continued. Because the stellar observations can be done during bright time, we feel that the CCD allows elegant integration of two very different research programs.

6. CONCLUSION

Preliminary observations using the system have produced very encouraging results in both the CCD hardware performance and our image processing capabilities. Although some "bugs" have not yet been ironed out, we expect to produce our first research images in March of 1986. The time and effort spent on the system will result in a frontline extragalactic research tool that transforms a small telescope into one as powerful as a large telescope.