

# Notes on Trip to Magellan Telescope, July 2006

Antony A. Stark

*Smithsonian Astrophysical Observatory, MS12, Cambridge MA 02138*

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`aas@cfa.harvard.edu`

This memo summarizes technical notes made on a trip by A. Stark and F. W. High to the Magellan telescopes at Las Campanas Observatory in Chile, July 2-7 2006. Also at Magellan during our visit were Alan Uomoto, Magellan Technical Manager, and Frank Perez, Magellan Project Supervisor. Members of the Magellan Science Advisory Committee: Robert Kirshner, Paul Schechter, Gus Omler, and Douglas Richstone, were also visiting the observatory. The travel generally went well, although there were several airline delays of several hours each. The observatory living quarters and dining facilities were fine, an indication that possible future extended observing trips would not be a hardship. Technical notes:

1. Observing on the Clay telescope was Vik Dhillon, who is a reader in astrophysics at the University of Sheffield in England. He was one of the designers of Ultracam (<http://www.shef.ac.uk/physics/people/vdhillon/ultracam>), a high-speed multi-band photometer with many similarities and some differences to PISCO. Ultracam has been used successfully on several telescopes since 2002. It has only three bands,  $u$ ,  $g$ , and  $r$ , and the presence of  $u$  tends to dominate the requirements of the optical design. Like PISCO, it has a collimator, dichroics, and re-imaging optics. Unlike PISCO, the dichroics are used at  $45^\circ$  angles of incidence, and the bandpasses are primarily determined by subsequent SDSS filters. Discussions with Dr. Dhillon indicated that the wavelength-dependent effects of high angles of incidence at the dichroics were not considered by the Ultracam design team. Nevertheless, tests indicate that bandpass response of the instrument has not been a problem, perhaps because the instantaneous field of view used is always small and the filters help obviate any deficiencies in the dichroics. Ultracam has about 20 air-glass surfaces in each arm of the instrument, compared to 8 for PISCO. The re-imaging optics in Ultracam are essentially classic double-gauss type camera lenses, and they are different for each of the arms. The beam at the dichroics is precisely collimated, and the front and back surfaces of the dichroics are precisely parallel: this means that ghost images reflected from the back surface of the dichroics are imaged on top of the unghosted image from the front, and only slightly out of focus. The dichroics on Ultracam are 10 mm thick.

2. Vik Dhillon also mentioned two other multi-band photometers: BUSCA (University of Bonn for Calar Alto) and HOPI (for SOFIA). BUSCA has a very simple design without lenses. The dichroics are used at a  $45^\circ$  angle of incidence in the f/8 beam of the telescope. Rumor is that these instruments have flaws that prevent their effective use.
3. Located at each folding port are two 20 Amp 115 VAC 60 Hz circuits, one on a UPS and one not. It is suggested that “dirty” electronics such as motors not be powered from the UPS. 220 VAC can be supplied if needed. There are also “quick connects” for supply and return glycol. The glycol supply is about 2 gallons per minute at about 35 psi (this is Frank Perez’s recollection—check for accuracy). The glycol supply is at ambient temperature, meaning that it can vary from about 20 C to 0 C. Also available is “shop air” compressed air for actuators.
4. Cryotigers should be electrically isolated from their gas supply lines. Use a “90 degree coupler” with insulation. Cryotiger compressors will be located in the azimuth bearing room, and attached to the part of the observatory floor (which is the ceiling of that room) that rotates in azimuth.
5. The instrument should be connected to its main control computer by optical fibers. The control computer will be located in a non-rotating equipment room. (Check on cable length to this room.)
6. Cable wrap for folded ports is under development by Bruce Bigelow. We need to provide inventory of PISCO cables for wrap by 19 July 2006 meeting.
7. The interface to the telescope control needs to be optimized for speed. Much of the needed work on the telescope end has already been done by Skip Schaller before he left Magellan. We talked to Mark Phillips about this, and he suggested we talk to Paul Schechter, who was working with Skip Schaller.