DISCUSSION OF POSTER PAPERS : SECTION I

Cadmus and Melsheimer - The instrumentation and observing program... .

Gaustad: Is it easy to add new instrumentation to the guide-acquire module?

Melsheimer: The only requirement is that they have the same focal plane position. Some flexibility is obtained by having the N, E, S and W ports of the guide acquire module with a slightly different focal plane position. A translating rotating diagonal mirror brings the light out at the required port.

Hiltner: My comment does not apply so much to small telescopes as to larger ones where the cost of light loss becomes quite significant. I'm always concerned about the loss of light at the flat mirror needed for directing light to the various instruments. This mirror may "cost" two hours of observing for each 10 hour night.

Melsheimer: In a small college where one doesn't have the manpower, or one doesn't want students changing (and possibly dropping) instruments in the middle of the night, it's a convenient and versatile package.

Evans: It's OK in a teaching institution, but it can be a curse in a working observatory to have all types of instrumentation on every telescope.

Melsheimer: The television system which Bob Cadmus has made works very well, is very inexpensive and uses a SONY CCD TV camera which costs $US750. He bought an image intensifying system and can now see $16^{m}.5$ at 30 frames/second.

Caton and Pollock - A four-star photometer for use on small telescopes

Latham: What is the status of this project?

Caton: We are awaiting NSF grant funding, as it is well beyond the normal equipment budget at our university.

Barwig: Do you use photon counting techniques?

Caton: We are not currently using pulse-counting, but rather we use a voltage-to-frequency converter and integrate this signal.

J. B. Hearnshaw and P. L. Cottrell (eds.), Instrumentation and Research Programmes for Small Telescopes, 123–131.

Genet: Norman Walker at Royal Greenwich Observatory has a 4-channel fibre optic feed photometer in operation. It chops between the four channels.

Graham: Is fibre-coupling routine and fairly cheap to do now? I presume it is also convenient.

Caton: Yes, and they cost about $US100. For our application fibres are essential. We may want to access close pairs of stars and we couldn't get two detectors into this small area whereas we can get two fibres in.

Latham: There are some subtle effects of light loss through the fibre as one changes the angles at which the fibres bend.

Caton: The angles are kept fixed as the detectors travel on the plate.

Chen et al - An automated South Pole stellar telescope

Latham: Advantages of observing at the South Pole are a long night (~18 weeks) and constant airmass for a given object. There is also a very low precipitable water vapour content, which could make it ideal for IR work. Is any planned?

Wood: Yes we do but not during the present winter.

Crawford: Can you quantize the amount of water vapour content?

Wood: The Pole is in the middle of one of the biggest deserts on earth. The Pole is equivalent to 11,000 feet in ordinary conditions.

Gaustad: I believe water vapour at the South Pole is significantly less than 1mm of precipitable H_2O, sometimes as low as 50 microns.

Scarfe: What are the observing conditions like at the South Pole, with regard to length of cloudless periods, seeing, wind (and blown snow)?

Wood: Seeing is apparently not too hard, but wind and blown snow are real problems. We have had a continuous run of ~400 hours, but high cirrus and aurora can be a problem. These haven't bothered us to date because we are working on a bright object (γ^2 Velorum).

https://doi.org/10.1017/S0074180900151277 Published online by Cambridge University Press

Latham: How important are continuous (in time) data sets (20 - 50 hours) for the kind of work you have been doing with different periodicities?

Kurtz: It's essential! The sun, pulsating white dwarfs, Ap stars and cataclysmic variables all need continuous data sets. We need to use observers at different longitudes or polar observations (although I'm not convinced about this) to acquire these data sets.

Cochrane et al - The automated patrol telescope

Latham: What is the schedule for the completion of this telescope?

Payne: The telescope is now moving but the observatory (on Siding Spring mountain) is yet to be built or financed. We hope to have this completed by mid-1986.

Schulte in den Bäumen: Are there special reasons for using 2 different drive systems on this telescope?

Payne: For the declination axis we used the original worm gear on the telescope. We replaced the RA gear with a friction drive, principally because it was cheap (~$A400).

Graham: Have you given any thought about the way you search for supernovae? The Colgate experiment didn't turn up many more and most SN have been found the old way.

Payne: Not yet. My involvement has been with the servo-system and the software, and I haven't got around to the details of the astronomy yet.

Crawford - Automatic Photoelectric telescopes

No discussion of this paper.

Garrison - University of Toronto southern observatory

No discussion of this paper.

https://doi.org/10.1017/S0074180900151277 Published online by Cambridge University Press

Hickey - Construction of a 32cm Cassegrain photoelectric telescope

Garrison: I am most impressed with the idea, the quality and the dedication of amateurs who are putting together photoelectric photometers for work on variable stars.

Crawford: I want to second Garrison's comments on the quality of some of the current "amateur" telescopes and observations. They are excellent, much better than most or even all of the "professional" small telescopes. They are truly new generation telescopes. Bart Bok in his talks, often called himself an amateur astronomer - a lover of astronomy. That trait is shared by amateurs and professionals.

Isobe et al - A 75cm alt-az telescope with short time focus... .

Latham: How was the mirror made? Spin-casting or caste in a mould?

Isobe: A caste, where the moulds were removed by sand- blasting.

Graham: Is there a problem with field rotation?

Isobe: We have an instrument rotator on both the prime and Nasmyth foci. For the photometer and the spectrograph we don't worry about image rotation.

Latham: What kind of bearing do you use for the main azimuth bearing?

Isobe: High angular contact ball bearings.

Jain and Battacharyya - A single-channel polarimeter

No discussion of this paper.

Laubscher - CCD instrumentation at Capilla Peak Observatory

Zeilik: There is a hidden cost in the cost estimate. This is for the image processing system. We use a VAX and various peripherals. The cost in ~$US200,000 excluding the computer and the 4-5 man-years of software.

https://doi.org/10.1017/S0074180900151277 Published online by Cambridge University Press

Latham: Have you had enough operation yet to see what the reliability of the CCD system is or are you coping with problems as they arise?

Laubscher: We have had only one problem so far and that was due to connectors and cables. The system has exhibited excellent photometric properties from four short runs.

Graham: What are the weather statistics like? Is it dark? How does it compare with southern Arizona?

Laubscher: It used to be good, but the number of photometric nights has dropped off over the last three years.

Zeilik: New Mexico is, in my opinion, an underrated area for doing optical observations. The percentage of clear nights in the southern part of the state is equivalent to the Tucson area. The number of photometric nights has been ~30 - 40% over the last 5 - 7 years. The sky is very dark : V-band is 22^{m}/square arcsec. We have a good site at high elevation (9000 feet).

Jacoby: Now that you have worked with putting this system together and used it, I'd like to ask if you would work with developing this sort of system again?

Laubscher: Yes, I'm a graduate student! But overall, although it has been a lot of hard work, it has certainly been worth it.

Nankivell and Rumsey - The optical system of the Mount John 1m.....

Latham: What is the status of the telescope?

Nankivell: The optics for the f/13.5 configuration (for on-axis work - photometry and spectroscopy) are complete, but the f/8 optics (for wide-field work) are still being worked upon. We hope to take the telescope down to Mount John in early February and have it operational in mid- to late-February 1986. (As at end February the telescope has been installed at Mount John - ed.).

Saxena: How, and with what methods, was the optical quality of the mirror tested? Are any quantitative values as to the quality of the surface available?

Nankivell: The mirror was ground and polished spherical to establish an axial symmetric system. It was then deepened and tested using a Foucault test. The final testing and figuring was done using an Offner compensator. This removed the overall asphericity of

the mirror, and any deformations on the surface can be easily seen and refigured. When using any compensator one has to ensure that it is rigorously built and that dimensions and spacing of mirrors are accurately measured. No quantitative work on the wavefronts has been done. We will do that (e.g. a Hartmann test) once the mirror has been installed in the telescope at Mount John.

Robinson et al - Black Birch Astrometric Observatory

No discussion of this paper.

Saxena - A new polarimeter for stellar polarisation measurement

Latham: Polarisation measurements can be very precise, which means you need to have extremely high S/N, that is you need to be able to register a very large number of photons. In most CCDs, the individual pixels cannot hold that many charged (a few x 10^5). Are you going to combine pixels or are you confident that you can get the required S/N for polarisation measurements? The maximum S/N ratios that I've seen for CCDs are 300:1 or 400:1.

Saxena: Yes. We will need to add several integrations to improve our S/N ratio.

Duncan: There has been some work (Meyer at Chicago and Jura at UCLA) on weak interstellar lines, which achieved S/N ~ 1000:1 with a CCD. They have done a lot of processing (many frames with shifting and adding) to achieve this so I guess one can't directly compare this.

Graham: When will this system be working?

Saxena: In about a year or so, using the new Tektronix CCD chips.

Sullivan and van der Peet - A simultaneous two channel photometric... .

Latham: What is the schedule for completion of this instrument?

Sullivan: The photometer head has been completed by UT and is now in Wellington (NZ). The computer and electronic systems are underway and we hope it will all be completed and operational

https://doi.org/10.1017/S0074180900151277 Published online by Cambridge University Press

by February/March 1986. We rely on other institution's telescopes and we have been working closely with Carter Observatory. The total cost of the system is ~$NZ 75,000 for somewhat "old technology", although it is a two channel system. However the cost of a CCD is beyond the funding capabilities of NZ institutions, at least in the short term.

Takagishi et al - CCD camera for the 60cm telescope at Kagashima... .

Latham: The temperature that you operate at, -70°C, is quite warm compared to other CCDs. Do you have any trouble with dark leakage building up at this warm temperature? What is the longest exposure that you have made?

Takagishi: Our CCD has small pixel size compared to TI and RCA chips and we feel that -70°C is sufficient. Our longest exposure is 60 minutes.

Latham: That certainly answers my question!

Djorgovski: Can any of our Japanese colleagues tell us anything about the development of astronomical CCDs by Japanese industry.

Takagishi: The Japanese manufacturers of CCDs are very consumer orientated (e.g. the video camera). We are trying to get them to manufacture astronomical quality ones but we have had no success yet. We have to show them that there is a real need.

Melsheimer: How much did it cost?

Takagishi: $US15,000.

Tomita and Takahashi - A twin reflecting astrograph

Latham: One should always be looking for industrial funding rather than government sources. How did you convince a newspaper to fund your work?

Tomita: Halley's Comet fever has arrived in Japan, and the newspaper wanted a good photograph of the comet.

Andrews: You have a hyperbolic primary mirror and a Newtonian flat. Whereabouts are the correcting lenses in this system?

Tomita: A four element lens is used.

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Weller and Ingerson - An optical fibre feed for small telescopes

Hearnshaw: Is the feed from the Cassegrain or prime focus of the 1.5m? What is the focal ratio? And what is the beam size of the échelle?

Weller: Cassegrain, f/13.5. This is not optimum but it was a compromise. We would like a faster input, close to the numerical aperture of the fibre, that is, using the prime focus. The other consideration however is that the faster the input beam, the faster it comes out and since we are feeding the échelle collimator focal plane a fast beam would overfill the collimator. Our échelle has a 10cm beam size. What we need is a custom built échelle spectrograph matched to the fibre.

Rowe: Intrinsic light losses in the fibre are very small, most of it occurs at the ends. One can match the fibre quite well using a microscope objective.

Weller: This is true. We use a sapphire ball on the end of the fibre. The major advantage of fibre feeding is the stability for radial velocity work. (No flexure and the temperature can be kept constant). The fibre thus provides a good mixer for the stellar spectrum, comparison spectrum and flat fielding lamp.

Mochnacki: What size fibre core are you using? DDO has 2 people working on fibres $> 50\mu m$ but I am interested in thin fibres (core diameters $< 50\mu m$). Do you have any information on this?

Weller: 200μm. Jacques Beckers has been testing some thin fibres in a single mode operation.

Hearnshaw: Schiffer at Heidelberg is using a 34μm fibre to feed their spectrograph. The degradation from input to output is 10% (f/3.5 to f/3.2). Information on this system has been published in Mitt. A.G. 54, 182 (1981).

Rowe: Most of the parameters for these fibres have been published in the engineering literature.

White - To upgrade a telescope?

White: We intend to send a description of the upgrade of the 42" and 72" telescopes at Lowell to P.A.S.P., but we thought this conference was an appropriate place to raise this question of upgrading telescopes with, for example, computer controls.

Melsheimer: What kind of pointing accuracy are you getting now?

https://doi.org/10.1017/S0074180900151277 Published online by Cambridge University Press

White: Two answers:
- 72", a 50 year old, off-axis English mount telescope is of the order of 10 or 20 arcsec if we make all the corrections.
- 42", a rigid fork mounted telescope sets to better than a few arcsecs.

Young et al - An automated photometer for a 1m telescope

Latham: What is the status of this project?

Angione: It is under construction at the moment and we expect to have it operational by June or July 1986. We hope to be able to do the most precise photometry possible which was one of the initial philosophies behind this project. It has more optical components than one normally sees in a single channel photometer but we wanted high quality images, maximum throughput and also to avoid vignetting.

Crawford: The kinds of precept which you have described are important for all photometric work.

Angione: Andy Young is actually writing another paper which is detailing all the considerations which went into our design.

Wan Lai et al - The main features of the 1.56m telescope and... .

Hearnshaw: What is the mirror material? What is the expansion coefficient of the material? Are mirrors blanks able to be purchased from this company?

Zhu Neng-hong: Both the primary and secondary mirrors were made by the Shanghai Yao Hua Glass Factory. The material is just like Zerodur or Cervit, and has an expansion coefficient of $1\text{-}2 \times 10^{-7} K^{-1}$. Mirror blanks can be purchased from this factory with diameters up to 2m.

Kulkarni: I met a Chinese engineer in Delhi and he told me how they measure the thermal expansion of the glass. They take two one inch, $\lambda/20$ finished pieces of this glass. They leave one at room temperature and put the other one into boiling water. Then they put the two together and count the interference fringes. In addition, I would like to say that there are some very novel and clever features in this telescope.