

## POSTER DISCUSSION

POSTER SESSION A: DISCUSSION - I. S. McLean, Chairman

Reiss - Page 319

McLEAN: Why did you choose to combine transputers and DSPs in your system?

REISS: Transputers are ideal for high level parallel programming, however they have problems when it comes to precise, jitter free timing. DSPs are perfect timing machines and more suitable for low-level programming.

GLASS: We use transputers for timing the pulse information. No interrupts are used. The link is the limiting factor in readout speed. One crystal (on transputer card) provides all the oscillator frequencies to the controller.

BONANNO: The CCD controller of the Italian National Telescope is based on transputers and DSP. I wish to stress the possibility of easy maintenance and debugging by using transputers: the controller can be reached from any point on the network. Even if the speed of the link is almost 20 orbits, in applications such as CCDs, where the readout is slow, the operation can work. Furthermore in transputer network it is easy to demand the image reformatting (output from four channels) to a certain transputer that is not busy. This procedure it is easy to implement because it can be written in a high level language (OCCAM). Don't forget that TRAM modules are off the shelf products available in the electronic market.

WAMPLER: Which system has the best noise characteristics? As an observer I have had a lot of problems with pick-up noise.

REISS: It is important to synchronize the CCD timing generator and data acquisition to a single, jitter free master clock to avoid internal interference. External interference can be avoided by proper grounding, shielding and EMC control.

LEACH: With transputers having limited link speed and having some difficulty in being used for timing generators, what are they useful for in an array controller?

REISS: The link speed of 1.5 MByte/sec is sufficient for most CCD applications. Transputers are very well suited for embedded control and parallel systems.

Szecsényi-Nagy - Page 331

SZECSENYI-NAGY: Our problem is how to replace the old, but from today, more expensive image recording device (the plate) by a modern semiconductor device which may be used repeatedly. We have the necessary computing facilities, computers and also image processing software has recently been started but we cannot afford two millions of US dollars as it has been mentioned in the case of Lick Obs. We have about 1% of that amount but we wanted to spend it optimally. We read the offers of different manufacturers and see how large are the differences in their prices. Even CCD-systems with very similar technical specifications and capabilities may have shockingly different price tags. As we have not had the opportunity to

study such systems in detail or even use them for night observations, we badly need the comment of those colleagues who have experience with commercially available CCD cameras. What we need is a 1k x 1k CCD with TE cooling and a filter wheel. You may suggest systems current on the practical usage etc. here or at the board.

VENKATAKRISHNAN: When one is constrained by money we have to just go ahead and use the systems and evaluate them. We will always find something to extract from the data.

Didkovsky - Page 333

McLEAN: Can you tell us a bit more about your alignment system?

DIDKOVSKY: A new Ritchey-Chretien telescope "Spectrum-UV" which is currently being designed, will be equipped with two spectrometers installed at significant distance (55 mm) from the center of the field of view. Therefore, any displacement and/or tilt of the secondary mirror may strongly affect the quality of image in the spectrometers.

Goncharov - Page 335

McLEAN: What is the state today of your project to modernize the Pulkovo vertical circle?

POLOJENTSEV: We are ready to order the parts, especially the CCD matrix.

Yershov - Page 339

YERSHOV: Referring to my poster, the main attention in this work is paid to autocollimation control of the reflector telescope optics to use it in astrometric observations. Two wavebands are planned to be used for the observations with two detectors: a Pbs array of 66 x 64 pixel (K) and a 68 x 580 CCD-array (J and visual). Sitallic optics are being made now and test observations are planned this year with the Pbs array installed in one of the Pulkovo reflectors. The work is planned to be finished at the end of the next year.

McLEAN: What's the cost of your devices?

YERSHOV: It depends upon the device grade, but it is up to two times less than the price of the Gen II MCP image intensifier. The 1<sup>st</sup> grade EB-CCD costs approximately \$5,000.00.

McLEAN: Were your EB-CCDs used in astronomy?

YERSHOV: Not yet, because they were classified up to now because of military applications. But just now the project is beginning with these devices as the guiding sensors for the Special Astrophysical Obs. in Zelenchuk.

McLEAN: What is the field of application of these devices?

YERSHOV: The EB-CCD's, as the convenient intensified CCD's, are intended to be used in the case, where the sensitivity of the CCD couldn't be increased by the CCD cooling or expanding the integration times; that is in the real time scale TV imaging. There are also very

attractive for the fast processes investigations, in adaptive optics applications, etc.

POSTER SESSION B: DISCUSSION - A. G. Davis Philip, Chairman

Guseva - Page 355

PENNY: NGC 188 would be a good open cluster to observe.

GUSEVA: I cannot answer immediately, thank you, I will look at this cluster if it is suitable for us.

PHILIP: Do you have plans for starting now on a program of setting up standard fields?

GUSEVA: Yes, I'm going to obtain catalogues of some related fields.

SCHILDKNECHT: What accuracy are you aiming at in your program?

GUSEVA: No worse than 0".1. I hope it will be better, of the order of 0".03 - 0".05.

CUYPERS: I want to inform you that colleagues at Hoher/List (Germany, M. Geffert and others) and at the Royal Observatory (D. Sinachopoulos and myself) are working on standard fields for astrometry with CCD. These fields include open clusters with well known proper motions, a field around the bright quasar 3C273, and we are investigating the Landolt fields of faint photometric standards. I also ask the CCD-observers of open clusters to publish or make available the positions of the observed stars and not only the photometry.

Bykov - Page 353

PHILIP: Have you plans to determine the orbits of many additional asteroids?

BYKOV: Yes, I plan to determine the orbits of any celestial objects moving on the background of the reference stars and having the accurate use of CCD-observations. In particular we collaborate with the SWT-group.

PHILIP: And will you be able to continue using results from 12 telescopes?

BYKOV: Yes. Our software allows us to calculate orbits by Laplacian method and the Pulkovo AMP method on the base on supershort arc positional CCD and photo observations. Then each observatory may send us the observations by email for testing.