DISCUSSION OF POSTER PAPERS : SECTION III

Beavers and Eitter - The first eight years of radial velocity studies...

Burki: Could you make a comment on the zero-point comparisons you made between your radial velocities and those observed by other groups? What about the IAU standards?

Beavers: Yes, we compared our zero-point with that of other observatories. We looked at stars in common, some of which were IAU standards. The number of stars in common varied from institution to institution. Our zero-point is similar to that of the Lick Observatory which is close to some of the IAU standards.

Latham: At the IAU General Assembly in Delhi a working group was formed to work on setting up a new set of standards of stellar radial velocities. We plan to observe about 15 stars extensively at three or four observatories, with an absolute zero-point calibration against minor planets. We think it may be possible to achieve a precision of 0.1 km s^{-1} in the mean velocities of the new standards and in the absolute zero-point.

Gray: I believe there will be difficulties in attaining a grid of radial velocities accurate to 100 ms^{-1}, because at this level the asymmetries, caused by stellar granulation, come in. As a result, the measured radial velocity will depend on the technique used to measure it. Internal-consistency errors and radial-velocity variations, of course, can be pushed to this level and beyond. The problem will not be cured by modelling the solar case in isolation because stellar granulation varies with spectral type and luminosity class, and it may also depend on age. The granulation asymmetries depend on rotation velocity, and there are smaller dependences with excitation potential of the line and line strength. Stellar granulation may be a real limiting factor for radial velocity measurement, but then, stellar granulation is a fascinating area of astrophysical study for some of us.

Latham: I agree that the accuracy of the zero-point determination may be limited by astrophysical effects. By using minor planets the zero-point will be referenced to the sun, so perhaps these effects can be modelled theoretically.

Denby et al - FAGS : a fast Astronomical Grating Spectrograph

Graham: On what telescopes do you plan to use this instrument?

J. B. Hearnshaw and P. L. Cottrell (eds.), Instrumentation and Research Programmes for Small Telescopes, 465–472.

Denby: On the 24" and 40" at Siding Spring Observatory. At the moment we have it on the 24" at Mount John.

Latham: Can you describe the wavelength sensitivity and readout noice of your CCD?

Denby: The readout noise hasn't been determined yet. We are only in the very early stages of commissioning the instrument and it has not been cooled yet. Spectral sensitivity drops off rapidly below λ360nm. In the red it extends to ~1μm.

Hiltner: I want to emphasise that it is important to eliminate all unnecessary reflections in the design of optical instruments. Each mirror "costs" approximately 2 hours of observing of each 10 hour night.

Duquennoy and Mayor - Multiple stellar systems

Scarfe: In the cases where the spectra are never fully resolved, how do you determine the parameters of the fitting functions used to resolve the dips?

Burki: We cannot obtain all the parameters of the dips, but we can obtain, in some cases, the separation using a mathematical treatment developed by Duquennoy.

Latham: The survey has tended to pick out companions with fairly short periods and low velocity amplitudes. This is a good recipe for a low mass companion. What is the lowest mass found this way?

Burki: I don't know.

Garrison: I want to raise two questions (complaints) about this type of spectrograph: 1) early-type stars are not being done and 2) there are no archives, so one can't go back and look at variations of spectra over time. We have been getting lots of good temporal information of shell stars from old DDO, DAO, Mount Wilson and Michigan plates.

Latham: There are techniques which are now being developed (e.g. Abt at Kitt Peak), using solid state detectors, to obtain radial velocities for early-type stars. It's crucial to do good flat-fielding so the continuum is straightened out across broad, strong lines, e.g. Hβ. Comparing the wings gives radial velocities to ~3 km s^{-1}.

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Scarfe: I have used a mask (at DAO) based on Procyon to measure A stars with low rotation velocities.

Latham: With the CfA stellar velocity systems we do make archival records of the spectra. However, these are not the best spectra for other applications. First, the signal-to-noise ratio tends to be in the range 3 to 5, and it is hard to measure individual lines. Second, the observations are taken for radial velocities, often with lots of moon light or twilight contamination. Thus the spectra are poorly suited for spectrophotometry. I agree that it is helpful to have the spectra, but I worry that they are not suitable for other applications.

Djorgovski: The trouble with these types of spectrographs is that one wastes a lot of light with the mask. One should take real spectra and use Fourier techniques on it to extract velocities or whatever you want.

Fletcher: You don't lose a lot of light with the mask, maybe 30%. Also the cost of this type of instrument is much less than a Shectman-type system.

Hearnshaw: There is no radial velocity information in the continuum, so why not throw it away?

Finkenzeller et al - Spectroscopic surveillance of the variable... .

Garrison: Are you intending to follow up this work?

Finkenzeller: Yes, using CCD spectrographs at Lick and at Berkeley. We will do a short-term monitoring program on T Tauri stars, which have periods of 4-8 days for which one can obtain better rotation information than for the higher mass, faster rotators.

Rucinski: Fred Vrba, Steve Strom and other people have started photometry of a number of T Tauri stars using a CCD photometer at Naval Observatory. This should provide photometric rotation periods for T Tauri stars in NGC 2264 or, possibly, in the Taurus Cloud.

Garrison: Herbst has bought 5 nights/month (for a 2 year period - six months still to go) at the University of Toronto's field station in Chile to do Hα photometry of T Tauri stars.

Mochnacki: Is there any evidence of binaries in these stars?

Finkenzeller: No, only a few appear to be double.

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Latham: More will be uncovered because these objects are very difficult to study spectroscopically. This could hide a lot of the binaries.

Finkenzeller: Walker (at Santa Cruz) has set up a long term program to monitor radial velocity changes in T Tauri stars.

Fletcher and McClure - Radial velocity spectrometers on the DAO... .

Mochnacki: Is the spectrometer on the 0.4m telescope a coudé or cassegrain?

Fletcher: A bit of both! Its optically fiber fed from the cassegrain focus. We want to reduce the amount of time doing comparison spectra (before and after each stellar observation) because of flexure in the cassegrain spectrograph.

Latham: What do you think the limiting magnitude will be on the 0.4m telescope?

Fletcher: From some of the tests we have done we can probably get to about 14 mag, but maybe 12 mag will be more realistic under normal observing conditions.

Garrison: Don't you have trouble with degradation of the focal ratio when using the optical fiber?

Fletcher: We have taken care of this with "extra optical elements". We don't lose too much overall because we don't have to observe as many standards.

Latham: When you said you were losing a fair amount of light with the fiber you actually mean a lot!

Fletcher: We are now getting about 1/3 of the light through the fiber but we expect to improve that to about 1/2 with better alignment of the optical fiber. We may also be able to get around other problems, e.g., guiding errors, by having the spectrograph fixed, and thus improve the efficiency of our observing technique.

Hearnshaw: What is the diameter of your fiber?

Fletcher: About 50μm.

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Gaustad - Temperature and brightness variations on Betelgeuse

Gaustad: Indeed, this is a very inefficient system at present. This was a pilot project to see if I could do anything useful on stars with an instrument designed for solar spectroscopy. The detector system will soon be replaced with a Reticon, and then I should be able to reach 6th magnitude stars at 0.1Å resolution with a S/N = 100 in 1 hour.

Rowe: Has anyone made a series of speckle observations of Betelgeuse which might show rotation?

Gaustad: Not to my knowledge, I have seen nothing published since the original speckle observations which are now some 8 years old. I am not sure why this technique has not been used more.

Honeycutt and Peery - An off-the-shelf Reticon system

Gaustad: What is the effective quantum efficiency of your system?

Peery: We haven't measured it yet. However, I would like to add that one of the reasons we bought the detector was that is has been used extensively, and successfully, by chemists in the laboratory.

Levato: We have used an OMA II system with a small spectrograph manufactured by Ridell-Spotz Scientific Instruments. The system works quite well. We used it for monitoring Be spectra but we did not lower the temperature below -40°C. The efficiency in the red is ~60%.

Jugaku: With your system what kind of research programs do you have in mind?

Peery: My research intersts have been and will continue to be in high dispersion spectroscopy (abundance work and isotope ratios) but we expect to undertake routine monitoring projects as well.

Jeffers and Stiff - Stellar spectrophotometry with a micro-computer... .

Graham: Is the fact that you are situated within the city limits of Toronto the reason why you take such care with your extinction measurements?

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Jeffers: We were interested to find that even in an urban site pure Rayleigh scattering was the best fit to the data.

Weller: I have measured the extinction as a function of wavelength with the SIT vidicon. Over most of the wavelengths covered Rayleigh scattering was a good approximation but breaks in the curve of $k(\lambda)$ vs λ are seen, caused for example by the onset of the ozone continuum absorption.

McDavid - A microcomputer controlled CCD Hα spectrometer

Garrison: Where is your observatory?

McDavid: About 15 miles north west of San Antonio in the Texas hill country.

McMillan et al - A long-term radial velocity program of high accuracy...

Garrison: What is the limiting magnitude of the system? What is the cost?

Wisniewski: About 4-5 mag, and they expect to go fainter. The cost of the instrument is high, but it is very elegant.

Barwig: 1) To what extent is the accuracy of your instrument influenced by guiding errors? 2) What's the core diameter of the fibre used?

Wisniewski: 1) No influence. 2) 125 μm.

Kurtz: Is the instrument portable? That is, can you put it on an aircraft and take it to another observatory?

Wisniewski: Yes.

Mochnacki et al - The DDO photon counting spectrometer : a well... .

Scarfe: Could you explain what you mean by "well-dressed"?

Mochnacki: It refers to the way we built it. Although we followed the Latham-Geary design we made a number of innovations. We want to mount the whole instrument on the telescope and talk to the

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outside world via RS232 serial lines. We also have an on-board microprocessor. We also use speed-wire technology.

Levato: Can you comment about the cost of the system?

Mochnacki: We had a grant for ~$CAN90,000 which included labour costs.

Wolf and Kern - Spectral classification of eclipsing binaries

Batten: A homogeneous list of spectral types, such as is given in this paper, is very valuable and will be of much use to future compilers of catalogues of spectroscopic binary orbits.

Graham: Is the difference you give in spectral type for a given system significant?

Wolf: Most of the variations, especially those from one minimum to another are believed to be real. Those variations in spectral type of spectra at maximum may be due to effects of the combined spectra. One subclass variation may be the scatter in the classification process; 2 or more subclasses variation is probably real.

Garrison: Corbally is publishing an atlas of visual double stars, showing individual spectra and combined spectra, so that one can see the effects of contamination.

Mochnacki: Have you or anyone else classified all the binary stars in Popper's lists that are used in the mass-radius-luminosity relation?

Wolf: I did not specifically classify the stars in Popper's or other surveys, although many of those stars may have been on the program anyway.

Garrison: There is another list, compiled by Hiltner, Schild and myself, of 63 OB eclipsing binary stars for southern hemisphere observers which could form a starting point for a project with small telescopes. These stars come from composite MK dispersion spectra which we noticed when looking at 1100 OB stars in order to understand galactic structure. Follow-up photometry also confirmed their binary nature. Masses for these stars would be extremely useful, since there are very few masses for these types of stars.

Scarfe: Could you please remind me what your limiting magnitude is, and in which band?

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Wolf: The magnitude limit for the survey was 10th magnitude in V. For the later spectral types it was probably closer to 9th magnitude in V.

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