a parallèlement été mise en place pour permettre un positionnement à mieux que 0.″2 sur le ciel. On utilise pour cela le miroir de la bonnette pouvant être déplacé avec une précision de 10 μm soit mieux que 0.″1 dans le plan F/8. Tout en utilisant une étoile guide, l'offset s'effectue en trois temps: identification de la cible et calcul de l'offset de la bonnette, offset de la bonnette, offset du télescope pour replacer l'étoile guide dans la boite de guidage. Ce dernier point assure que l'étoile a suivi exactement le mouvement de la bonnette. Cette procédure a été utilisée avec succès en Décembre 88 et Juin 1989. Dès les prochaines observations de 89II, les offsets de la bonnette et du télescope seront effectués en même temps, l'étape ultime étant d'avoir la procédure complète commandée par le HP9000 utilisé pour l'acquisition des données.

Actuellement des flexions internes liées à l'optique de guidage de la bonnette entrainent une dérive des objets de l'ordre de 1" par heure dans le plan focal de l'instrument par rapport au plan focal de la caméra de guidage. Ce problème est en cours d'investigation et nous recommandons des poses maximales de 45 minutes.

Nous montrons comme exemple le spectre des deux composantes de la radio source 3C208.1 séparées de 3.9 secondes d'arc obtenu par Hammer et Le Fèvre en Décembre 88. Un spectre de 45 min a permis de confirmer le redshift de la composante principale associée à la radio source à z = 1.02 et de montrer que la composante faible de magnitude R = 21.6 est une galaxie de Seyfert d'avant plan à z = 0.156 (Figure 7). Le signal/bruit final est de 5 sur le continu de la Seyfert pour une dispersion de 10 Å/pix avec le CCD TH1. Ces données mettent en évidence un autre cas de contamination de source 3CR par une galaxie d'avant plan: 3C208.1 doit être amplifiée de plus de 0.5 mag en optique et 0.75 mag en radio et, après correction, la puissance radio intrinsèque de la source n'est plus suffisante pour qu'elle soit inclue dans le catalogue 3CR.

Olivier Le Fèvre

The Relative Performances of the UV Prime and Herzberg Spectrographs Blueward of 4000Å

1. Background

Measurements of atmospheric extinction indicate that Mauna Kea is an excellent site from which to perform observations at near-ultraviolet wavelengths. CFHT currently has two spectrographs which are used in this spectral region: the coudé, which offers three dispersions for high resolution work, and UV Prime, which is restricted to a single intermediate-resolution configuration. Because of the fixed configuration of UV Prime, a UV 'resolution gap' exists, and programs which require observations at resolutions different from those available with either the coudé or UV Prime currently cannot be accommodated.

The situation is exacerbated by the limited range of programs which can be done with UV Prime due to the shortcomings of the detector. The spectrograph design is such that a dedicated detector is required, and the CCD currently in use, RCA3, suffers from a low quantum efficiency in the UV and a high read noise ($55e^-$). Therefore, in an effort to expand the spectroscopic capabilities of CFHT in the UV, we have undertaken a program to evaluate the performance of the Herzberg spectrograph in this wavelength range. Although originally designed to have UV capabilities, in practice the Herzberg has only been used for programs redward of 3500 Å. Our primary goal was not to determine the absolute efficiency of this spectrograph, but rather to compare its overall performance, including detector, to that currently available with UV Prime. Two sets of measurements were made. The first were in the lab, where the relative efficiencies of the spectrographs were determined using an artificial source. The TH1 CCD was used as the detector for the Herzberg spectrograph. The second set of measurements were made on the sky. Two spectrophotometric flux standards, which had been observed previously with UV Prime under photometric conditions, were observed with the Herzberg spectrograph using the PHX1 CCD.

2. Lab Tests

The calibration source used for the lab tests was an Osram 1000 watt lamp, which was mounted inside a box with a UV-transmitting diffusor as an output window. Power to the lamp was controlled with a VARIAC power supply, and the output at a given setting was found to be reproduceable to within a few percent. The source was placed directly in front of each spectrograph slit, and a spacer unit was used to position the apparatus at a distance appropriate for the focal ratio of each spectrograph. Arc exposures were also recorded to provide a wavelength calibration.

The slit environments of both spectrographs were found to have light leaks, and although it was possible to reduce these somewhat, the remaining scattered light restricted the usable data range to between 3600 and 3900 Å. After correction for geometrical factors, our laboratory results show that the Herzberg spectrograph, which was configured with blue optics, Grating #6 (166 Å/mm dispersion, lambda-blaze = 4200 Å) and the TH1 CCD is more sensitive than UV Prime and RCA3 from 3600 Å to 3900 Å. Specifically, we find that the ratio of the recorded signals, in units of electrons detected per wavelength interval and in the sense Herzberg/UV Prime, varied from 1.4 at 3600 Å to 1.3 at 3900 Å.

3. Sky Measurements

The sky data were recorded during the night of April 11/12 1989. Two spectrophotometric flux standards, Feige 34 and Feige 66, which had been observed previously with UV Prime under photometric conditions, were re-observed using the Herzberg spectrograph and PHX1 CCD. The optical set-up of the Herzberg was identical to that used for the lab tests, and a wide slit was used to minimize light loss. Slit losses for the UV Prime data were also negligible.

Unfortunately, the night was not photometric, and the stars were observed through varying amounts of cirrus.

Therefore, these data can only be used to determine a lower limit to the relative efficiency of the Herzberg with respect to UV Prime. The results, based on the data which had the least amount of obscuration, are summarized in Table 1. We note that the relative efficiency at 3600 Å in **Table 1** is different from the value recorded in the lab for two reasons: (1) the non-photometric sky conditions, and (2) the difference in quantum efficiencies between PHX1 and TH1 (20% versus 30%, respectively, at UV wavelengths). A somewhat surprising result is that the Herzberg spectrograph + PHX1 is more efficient than the UV Prime + RCA3 at 3100 Å. We suspect that this is due to the low quantum efficiency of RCA3. At other wavelengths the relative efficiencies of the spectrographs appear to be more-or-less comparable.

4. The Bottom Line

Our experiments indicate that the Herzberg spectrograph configured with blue optics and either TH1 or PHX1 has an efficiency which is comparable to that currently obtainable with UV Prime. This situation could change if RCA3 were replaced with a higher quantum efficiency device. However, there are no plans to do this soon.

For applications which are read-noise limited the Herzberg has a significant advantage, since TH1 and PHX1 have read noises of $12/e^-$ and $7/e^-$ respectively, compared with $55/e^-$ for RCA3. Consequently, we recommend that the Herzberg spectrograph be used for all UV programs where the signal is read-noise dominated. Moreover, the Herzberg should also be used for all programs concerned with wavelengths redward of 3600 Å.

Finally, we point out that the Herzberg has an arsenal of eight gratings, and many of these could be used in second or third order, where the blaze wavelengths fall in the UV. We summarize the characteristics of the gratings which could be used at UV wavelengths in Table 3.

T. Davidge, J. Glaspey, S. Béland, C. Clark

Table 2

Wavelength	Ratio of Efficiencies*
3100	1.1
3200	0.6
3300	0.5
3400	0.5
3500	0.6
3600	0.7
3700	0.8

**Ratio of the number of electrons detected per wavelength interval, in the sense Herzberg/UV Prime.*

Table 3

Grating	Lines/mm	Blaze Wavelength (Order)	Dispersion (Å/mm)
1	1200	4000 (I)	41
3	830	4060 (II)	22
4	600	4000 (I)	83
5	300	3750 (II)	83
6	300	4200 (I)	166
7	300	3330 (III)	55
8	150	2500 (II)	166

Coudé Improvements

The coudé spectrograph with the f/8.2 camera is the CFHT instrument with the longest continuous service record, but that does not mean that changes have not been made to improve its overall performance. For the benefit of those coudé users who have not observed with the spectrograph recently, we shall describe some of the modifications which should make working at coudé a more pleasant experience.

1. The 1872 Reticon detector now has an 'Autofill' system that provides continuous cooling for up to 7 days without intervention by the observers. Once operating, the timer adds liquid nitrogen to the detector housing at about 06:00, 10:00, 14:00, and 18:00 hours each day. Observers are warned to avoid taking stellar exposures (or arcs or flats) at those times, since the stiffening of the hose carrying the LN2 may move the detector very slightly.
2. Also related to the 1872 Reticon cooling, the path between the LN2 dewar inside the detector housing and the detector support itself now consists of two sections of copper braid, firmly attached to the housing at each of its ends. As a result the cooling rate is very steady throughout the night, typically keeping the detector temperature constant to within 0.05 °C.
3. An XY guider handset has been installed at coudé, simplifying the process of acquiring and guiding on stars. The X- and Y-axes of the buttons on the handset are fixed with respect to the horizontal and vertical axes of the TV viewing monitors, regardless of the declination or hour angle of the telescope.
4. An HP9000 workstation has been installed permanently at the third floor coudé observing area for use with the 1872 Reticon and all CFHT CCDs. New software is now in regular use that has been especially configured for the needs of technical staff and observers using the coudé spectrograph.
5. Last but not least, a revised version of the manual for using the 1872 Reticon at Coudé has been completed. Observers scheduled to use the Reticon during the 1989II semester should receive a copy of this manual automatically prior to their observing run. Anyone else interested in obtaining a copy should contact either Mrs. S. Wood at CFHT or the undersigned (BITNET: glaspey@uhcfht, or INTERNET: glaspey@cfht.hawaii.edu).

In the category of almost news, use of the autoguider at coudé was tested successfully in April, 1989. An operational version of the optical configuration is under study at CFHT, but will probably not be available for visitor use before 1990I. Tests were also carried out to determine the relative efficiencies of the three coudé mirror trains. Reduction of the data will occur over the summer months, with the results available in plenty of time to help schedule the coudé train changes needed for the 1990I observing semester.

J. Glaspey