High-resolution Observations of Faint Quasars

Figure 2 shows a spectrum of the distant quasar Hoag-Smith 2111-41 resulting from $4\,^1/_2$ hours of integration at a spectral dispersion of 30 Å/mm obtained at La Silla. The ordinate shows real photon counts for each picture element accumulated over the total integration time. Therefore the detected photon arrival rate is on average approximately 10 per picture-element per hour. Having a visual magnitude of 20 this is the faintest quasar ever observed at such a high dispersion.

One can see on the right the broad emission feature of Lyman α redshifted (Z = 2.64) to 4420 Å. Most of the sharp absorption lines will be the narrow Lyman α lines discussed above. Note that many of the lines have zero intensity at their centres, indicative of considerable absorbing material in the clouds. The lines in many cases are not resolved which will help put a significant upper limit on their widths.

Spectroscopic material of this quality is relevant to and exemplifies the discussion of items 1, 2, 4 and 5 above. In particular H-S 2111-41 is faint for its redshift, and was chosen because of that. If the "intrinsic" hypothesis is correct, one ought to see differences in the nature of the absorption-line spectrum (velocity distribution and strength of the lines) compared to the spectrum of a quasar with similar redshift but of greater luminosity. There is accumulating evidence that no significant differences exist in such comparisons, and hence the evidence goes against the "intrinsic" idea.

Another important observation at La Silla relevant to item 6 above was the observation of the $17\overset{m}{.}5$ quasar PKS 2020-37. It falls near but outside of a foreground galaxy of uncertain (spiral?) type. PKS 2020-37 (redshift Z = 1.1) was observed for 5 hours with the IPCS at a spectral dispersion of 30 Å/mm. The H and K Ca II absorption lines which are reasonably narrow, have been detected in the spectrum of the quasar but with the redshift of the nearby galaxy which was determined during the same period.

This supports the results and conclusions discussed as item 6 above, and reinforces the notion that galaxies have extended halos and can contribute to the narrow absorption lines seen in distant quasars. Figure 3 shows a tracing made at the telescope revealing the broad H and K lines in the spectrum of the galaxy and a tracing revealing the narrow lines in the spectrum of the quasar at almost the same wavelength.

Thus, the two observations discussed above serve to exemplify classes of almost limiting astronomical problems that are accessible to European astronomers using the 3.6 metre telescope equipped with a modern detector.

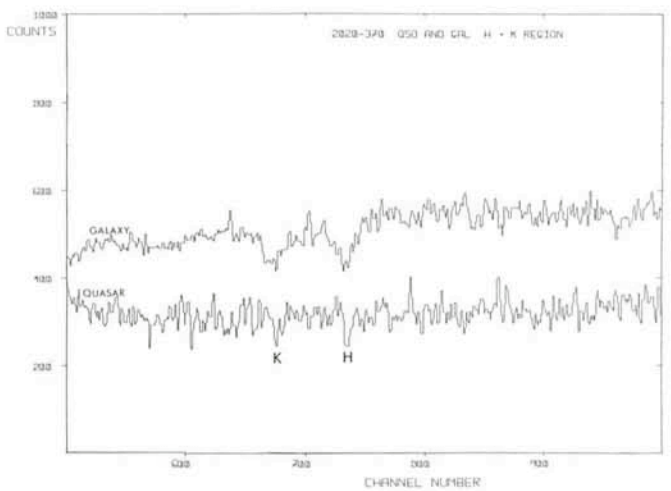

Fig. 3: *The upper tracing is that of the foreground galaxy discussed in the text. One sees stellar (and possibly interstellar) Ca II H and K. The lower tracing is the spectrum of PKS 2020-37 showing interstellar H and K at the same wavelength (or velocity) as the H and K in the galaxy.*

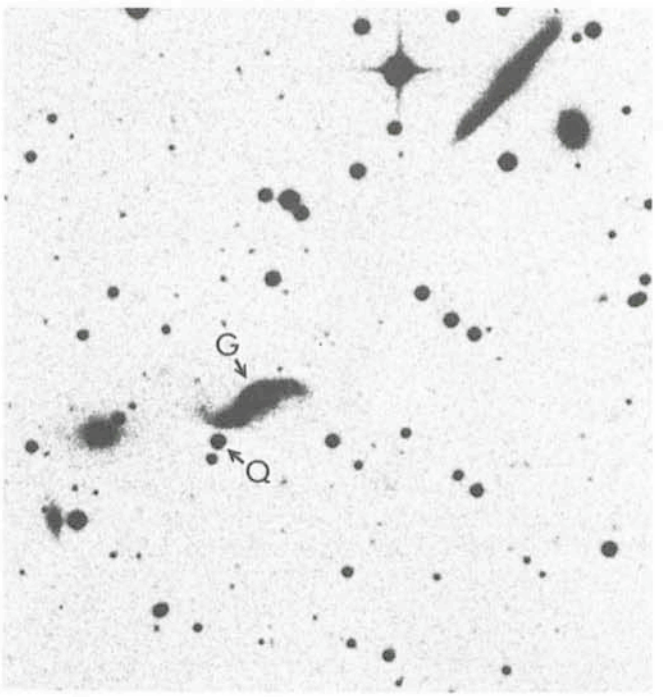

Fig. 4: *A direct photograph of the field of PKS 2020-37 reproduced from a IIIa-J SRC Schmidt survey plate. Arrows indicate the quasar PKS 2020-37 and the nearby galaxy.*

INFORMATION FOR VISITING ASTRONOMERS

Photographic Plate Service on La Silla

Recent analysis covering a period of 18 months has shown that various of the photographic emulsions offered to the visiting astronomers are never requested.

Since offering a photographic emulsion implies regular quality control, renewal of stock, etc., a considerable economy can be realized if emulsions that are never requested and used are suppressed.

As a consequence, only the emulsions listed below will be offered to the visiting astronomers as from January 1, 1979.

IIa-O, IIa-D, IIIa-J, IIIa-F, 103a-D, 098-02, IV-N.

Only for these emulsions will quality control tests be performed and the stock renewed regularly.

The emulsions 103a-E, 103a-F, 103a-G, 103a-O and I-N will only be available as long as the present stock lasts. Quality control tests will not be made any longer for these emulsions.

M. J. de Jonge