0.223, the latter a N galaxy having z = 0.306. We measured the profile at 7 equidistant wavelength positions symmetric around the expected line centre. We show in Fig. 4 the profile of the Pα line of the quasar; an estimated error bar is indicated. The accuracy of the profile compares favourably with Pα profiles obtained for some other objects by two American groups (Puetter et al., 1981, *Astrophys. J.*, **243**, 345; Soifer et al., 1981, *Astrophys. J.*, **243**, 369). During the same run we obtained Balmer line profiles with the Image Dissector Scanner attached to the Boller and Chivens spectrograph of the 3.6 m telescope. These are depicted for the same object in Fig. 5. The expected Pα/Hβ ratio from unmodified recombination theory is 0.35 (where a temperature of 10,000 K and opaque conditions are assumed). In our two objects we find comparatively enhanced values: 1.24 $\pm$ 0.3 for the quasar and 0.73 $\pm$ 0.4 for the galaxy. They are also higher than those found by Puetter and Soifer 1981 who find a range for this ratio from 0.09 to 0.72 for their sources with the exception of PG 0026+129, for which Puetter et al. found the very high ratio of 1.4 in 1978 (R. C. Puetter et al., 1978, *Astrophys. J.*, Lett., **226**, L53). The deviation from the recombination value may be explained by reddening in the sources and/or by optical depth effects. However, we think that the high Pα/Hβ ratios found by us indicate that the emission-line regions in nuclei are still poorly understood and substantial improvements in the line transfer calculations with and without dust absorption are necessary. Attempts in this direction are presently being done among others by R. C. Canfield and R. C. Puetter and by Mme S. Collin-Souffrin and collaborators.

Our observational results reported here are the subject of a more detailed paper (W. Kollatschny and K. Fricke, 1981, *Astron. Astrophys.*, in press). We are presently continuing our hydrogen-line observations in the infrared and optical spectral ranges using the ESO equipment and in the UV with the IUE satellite telescope in order to obtain complete sets of Lyman, Balmer and Paschen ratios for a sample of active galactic nuclei. We thus hope to provide useful constraints to improve the theoretical descriptions.

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ANNOUNCEMENT OF AN ESO WORKSHOP ON

The Most Massive Stars

ESO Munich, 23–25 November 1981

Among topics to be discussed in the workshop are the theory of evolution of massive stars, observations of luminous stars in the Galaxy and nearby systems, the effect of the presence of these stars on the structure and evolution of the interstellar matter in galaxies and their use as distance indicators.

The workshop will include both review papers and short contributions with ample time for discussion.

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UBV Photometry of Quasars

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I. The Disappointed Hopes

1. Hubble and the Birth of Observational Cosmology

Between the two world wars, a few people were, surprisingly, still concerned by extraterrestrial problems. One of them was Edwin Hubble, who discovered the so-called expansion of the universe, after proving the extragalactic nature of the great nearby spiral galaxies. Since then, astronomers have tried to understand the large-scale geometry of that newly opened universe. It is a long and still unsuccessfull story. . .

How can we use the extragalactic objects to study that large-scale structure? There are two powerful methods:

(a) Counts of distant objects, up to some limiting magnitude. The dependence of the number of objects found on the radius sampled in the universe can in principle tell us if our universe is spherical and closed, or euclidean, or hyperbolic and open (a euclidean universe is just the kind of universe we like, with non-crossing parallels and circle area obeying the good old r-square law). In fact, the deceleration parameter q is the crucial one which defines the overall geometry.

(b) Plots of the recession velocity – or of the redshift z – of distant objects as a function of their measured luminosity. If we assume that the different objects have the same intrinsic luminosity, this is equivalent to a plot of the recession velocity versus the distance. Usually, one constructs a plot of log z versus the apparent magnitude. For large values of z, the curves are very q-dependent and should tell us what is the "observational value", the one which fits best the experimental curves.

In fact, that approach initially failed: the most distant galaxies which can be observed are still too near to us, with z around 0.5. This is far too short an interval to allow a q determination.

2. Quasars: The Cosmological Boom

In the early sixties, a new class of extragalactic objects entered the astronomical scene: the quasi-stellar objects, or quasars. Now, we have at hand lists of such objects which should soon reach the 2,000 entries, with large redshifts up to 3.53, and a lot of photometric measurements, mainly UBV. So it seems that solving the cosmological problem is just a matter of drawing a large Hubble diagram, fit a curve to the observational points, and write q in golden letters in the Great Book of Astronomical Achievements. But Figure 1, which is a Hubble diagram tying the B magnitude to the redshift for 358 quasars, has a most unpleasant look. . . The accuracy of modern UBV photometry is too high to account for such a scatter. In fact, there are three main difficulties:

(a) Use of the Hubble diagram assumes that all the objects observed have the same intrinsic luminosity. Unfortunately, this is very far from truth for quasars: at the same redshift, the