

THE EFFECTIVE TEMPERATURES OF THE O STARS

S. R. Pottasch, P. R. Wesselius and R. J. van Duinen
Kapteyn Astronomical Institute and Space Research Laboratory,
University of Groningen

ABSTRACT

Far ultraviolet photometric observations (in 5 bands between $\lambda = 1550 \text{ \AA}$ and 3300 \AA) are presented for ten O stars which are also the exciting stars of diffuse nebulae. Since the number of photons shortwards of the Lyman limit is known for these stars, sufficient information on the total flux is available to determine the effective temperature without making any assumptions concerning a model atmosphere. Conversely, the distribution of flux with wavelength can be used to determine the applicability of a given model. A detailed discussion of this is presented.

A comparison of these 'normal' O stars and stars with O type spectra which excite planetary nebulae is given. It is concluded that the atmospheres of these two types of O stars are very similar; probably they have the same effective gravity. Further, a discussion of the Zanstra He II temperature is presented.

Editor's Note: The contents of this paper are in press in Astronomy and Astrophysics.

DISCUSSION FOLLOWING POTTASCH, WESSELIUS AND VAN DUINEN

Underhill: The photometry in the 5400 \AA band is a critical parameter in Pottasch's logic for obtaining T_{eff} and unfortunately Pottasch does not give the source or reliability of the absolute photometry which he uses in the preliminary paper he has circulated for comment. His effective temperatures for $\lambda \text{ Ori}$ and $\delta \text{ Mon}$ are about 4000 K lower than I find. My scale is in agreement with Conti's scale.

Conti: Right-on, Anne! Pottasch's temperature scale is about 10% cooler than mine, a little outside of what I feel is reasonable. Even

though Stuart Pottasch is not here to defend himself, and Tony Hearn probably can't reply either I must describe one worry. The fundamental magnitude calibration Pottasch used was taken from a paper of Kwan and Kuhl (1976) who did scanner observations for another purpose. This paper had some serious difficulties with wavelength dependence, particularly since the implied $E(B-V)$ was completely inconsistent with the observed excesses in some cases. This tie into the Kwan and Kuhl paper might be a problem of this temperature scale. Kuhl tells me a student of his is redoing the observations.

Bolton: Could anyone give a quantitative estimate of how sensitive the temperature determination is to some perturbation of the $\lambda 5400$ photometer?

Underhill: Yes. Basically Pottasch gets the angular diameter from this measurement. It's fairly sensitive.