semble. As expected, the result defines an effective "temperature" for each mode, showing that the photon statistics are the same whether or not the steady beam of light arises from a black-body cavity. The distribution in the number of photoelectrons, n, emitted during the time interval T by photons in a particular mode is also obtained and has the form

$$P(n)=(1-p)p^n.$$

This distribution has been used to verify the quantitative expression for the correlation obtained by Hanbury Brown and Twiss[1] and by Purcell,[2] thus supplying a proof whose need was recently suggested by Fellgett.[3]

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[1] R. Hanbury Brown and R. Q. Twiss, *Nature,* **178,** 1447, 1956.

[2] E. M. Purcell, *Nature,* **178,** 1449, 1956.

[3] P. Fellgett, *Nature,* **179,** 956, 1957.

THE SPECTRUM OF ε AURIGAE IN AND BEFORE ECLIPSE

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An investigation of spectrograms of ε Aurigae taken in January and April, 1957, when the shell spectrum showed a large Doppler displacement to the violet and was easily visible, has given these results:

microturbulence in the shell:	6 km/sec (January)
	7.5 km/sec (April)
microturbulence in the atmosphere of the F star:	10 km/sec (January)
excitation temperature for the shell:	4500 °K (January)
	4200 °K (April)
excitation temperature for the star:	5700 °K
electron pressure derived by the Inglis-Teller formula for the shell:	$\log P_e = -0.60$
for the star:	$\log P_e = +0.20$

Evidence for the existence of dilution of radiation in the shell is provided by the lines of Fe I, Ca I, and Mg I rising from non-metastable levels. We find $W = 0.13$ for the physical dilution, while the geometrical dilution is $W_o = 10^{-3}$ (assuming for the radii of the shell and the star the values given by Kuiper). The value of the electron density derived from the Saha equation, corrected for the physical dilution, or from the Inglis-Teller formula, is sufficient to explain the observed diminution of luminosity of 0.8 mag. during the eclipse, if this diminution is interpreted as being caused by electron scattering in the shell. The difference between the physical and the geometrical dilution suggests the existence of an excess of ultraviolet radiation of the exciting star, which suggests that the unseen companion of ε Aurigae is a B-type star. If we assume $T_B = 20{,}000$ °K and assume the difference between the bolometric magnitudes $M_F - M_B \approx -2$, we find $(M_F - M_B)_{\lambda 3500} = -1.5$ mag., and thus the spectrum of the B-type star would not be visible; at λ 1000 we find $M_F - M_B = +8.5$. For the radius and the mass we find

$$R_B = 10^{11}\ \text{cm}\,;\ \frac{m_F}{m_B} = 1.5.$$

Two spectrograms of ε Aurigae obtained in December 1952 and in January 1953 were also studied. The first shows relatively sharp lines, the other appreciably broader lines. We find that the variations in the line contours can be explained by an increase in macroturbulence from 29 km/sec (December 1952) to 32 km/sec (January 1953) and by an increase in microturbulence from 6 to 7.5 km/sec. In January 1957 the macroturbulence was 20 km/sec and the microturbulence 10 km/sec.

APPLICATION OF THE REFRIGERATED IMAGE ORTHICON TO SPECTROPHOTOMETRY

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The image section of a commercial television image orthicon approaches in performance the *ideal* photon receiver. Every pho-