[Proceedings of the Iowa Academy of Science](https://scholarworks.uni.edu/pias)

Volume 30 | Annual Issue — Article 18

1923

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THE DISTRIBUTION OF INTENSITY IN THE BROADENED BALMER LINES OF HYDROGEN

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(ABSTRACT)

The *intensity distribution across the broadened Balmer lines of hydrogen* H_β, H_γ and H_ϱ excited by condensed discharges for a pressure range from 48 to 250 mm. of mercury was determined by photographing the spectra through a neutral wedge. The broadening was symmetrical and the general form of the intensity curve was convex to the axis of wave-lengths; the curves for each line gave evidences of structure characteristic of the line.

A *theoretical analysis* yielded an expression which agreed with the general form of the experimental intensity curve, namely, the intensity $I\lambda$ at wave-length λ in the broadened line whose centre was at λ_0 is

$$I\lambda = \frac{a}{\lambda_0 - \lambda} e^{-\frac{b}{\lambda_0 - \lambda}}$$

where a and b are quantities which vary with the line and with the pressure; b is small. In the derivation of this formula the luminous atoms of the gas were considered to be subjected to electric fields caused by the charged particles of the gas, the electric fields being allotted according to a probability law. The electric field resolved the line into the Stark components, the displacement of the components from the parent line being given by a general relation due to Sommerfeld.

As a result of the theory the *action of the condensed discharge* in producing widening of the line is attributed to the high value of the current intensity through the gas in the early portion of the discharges, which may perhaps rise to hundreds of amperes. The slight structure in the broadened line may be explained in terms of the observed intensities and positions of the components of the electrically resolved line.