

## Correspondence

### Comment on “Hydrogen Balmer- $\beta$ and Balmer- $\gamma$ emission profiles in an abnormal glow region of hydrogen plasma”

The authors of a recent paper [1] show experimental results of hydrogen Balmer- $\beta$  and - $\gamma$  line profiles, analysing the dependences of those spectral lines on the fill pressure of the plasma chamber and the discharge power.

According to the data given in that work the plasma conditions were of order  $10^{21} \text{ m}^{-3}$  for the electron density and around 4000 K for electron temperature in the plasma, depending on the fill pressure and input electrical power (see Figs. 5 and 7 in Ref. [1]). The electron temperature was obtained from the relative intensities of  $H_{\beta}$  and  $H_{\gamma}$  lines and the electron density from the Stark width of the  $H_{\beta}$  line. For this range of densities and temperatures the Balmer- $\gamma$  line should have a width approximately twice the width of the Balmer- $\beta$  but this is not observed in their experiment.

In order to do plasma diagnosis the authors of [1] must assume that the plasma created between their electrodes with 75 mm diameter and separated by 60 mm is homogeneous and in thermodynamic equilibrium. Nothing about this is discussed in the paper. In addition, the authors state that the spectral resolution of their monochromator is 0.01 nm, which would correspond to a few percent of the widths of the lines showed in their Figs. 2 and 3.

Then, assuming that every required condition is checked and according to the spectral resolution given by the authors, one should expect reasonable profiles for the  $H_{\beta}$  and  $H_{\gamma}$  lines and not the profiles shown in their Figs. 2 and 3. Anyone who is not an expert on hydrogen lines could check the quality of these profiles by comparing, for example, Fig. 2 of [1] with Fig. 4.9 in page 111 of Ref. [2] (given as Ref. [10] by the authors of Ref. [1]) This figure corresponds to a  $H_{\beta}$  profile measured in an experiment done in 1975, 31 years ago. Though the conditions of both experiments are not exactly the same, that comparison could serve as an index of quality of the measurements in Ref [1]. Besides many other experimental as well as theoretical  $H_{\beta}$  and  $H_{\gamma}$  profiles can be found easily in the literature for wide ranges of both electron density and temperature. See, for example, the data given in Refs. [3–12]. It is evident that the profiles shown in Ref [1], as well as all the physical discussion following them are burdened by some grave experimental errors. Without exactly knowing the details of the experimental arrange-

ment, two sources seem to be the most probable causes of those errors. On the one hand, a large apparatus function (plus a possible optical aberration or alignment problem), see for example [13], that would have given rise to a large instrumental broadening. This effect would have blurred the Stark characteristics of the measured profiles that would justify the similarity of lines shown in Figs. 2 and 3 of [1]. On the other hand, a second possible cause would be the existence of inhomogeneities in the plasma, which would not be unusual considering the characteristics of the electrodes employed.

It is apparent that the referees, who may not be experts in this special area, have missed this point, which unfortunately, does not enhance the reputation of the journal. Unfortunately electronic submission has a large part to play in this as papers are submitted by authors without the usual careful consideration that hard copy submission attracts. In addition authors are pushed by their institutions to publish more and more (instead of more and better) and their evaluations sometimes are based upon “quantity” more than on “quality”. Science cannot become just a “cut and paste” business.<sup>1</sup> The referees are thus faced with an unreasonable increased load. The authors are responsible for their work but the journals are responsible for its publication. We must take these points in mind or we are guilty of abandoning any hope of improvement in the quality of Science.

## References

- [1] Qayyum A, Ahmad R, Ghauri SA, Waheed A, Zakaullah M. *Vacuum* 2006;80:574–80.
- [2] Griem HR. *Principles of plasma spectroscopy*. Cambridge: Cambridge University Press; 1997.
- [3] Griem HR. *Plasma spectroscopy*. New York: McGraw-Hill; 1964.
- [4] Griem HR. *Spectral line broadening by plasmas*. London: Academic Press; 1974.
- [5] Wiese WL, Kelleher DE, Helbig V. *Phys Rev A* 1975;11:1154–64.
- [6] Ehrich H, Kelleher DE. *Phys Rev A* 1980;21:319–34.
- [7] Helbig V, Nick K-P. *J. Phys B: Atom Mol Phys* 1981;14:3573–83.
- [8] Cardeñoso V, Gigoso MA. *Phys Rev A* 1989;39:5258–67.
- [9] Mijatović Z, Paulov M, Djurović S. *Phys. Rev* 1991;43:6095–7.
- [10] Zikić R, Gigoso MA, Ivković M, González MÁ, Konjević N. *Spectrochim Acta B* 2002;57:987–98.
- [11] Gigoso MA, González MÁ, Cardeñoso V. *Spectrochim Acta B* 2003;58:1489–504.

<sup>1</sup>Compare, for example, Section 3.3 of Ref. [1] with Section 2 of Ref. [14], which is the authors’ Ref. [7].

- [12] Djurović S, Nikolić D, Savić I, Sörge S, Demura AV. *Phys Rev E* 2005;71:036407.
- [13] Bousquet P. *Spectroscopie Instrumentale*. Paris: Dunod Univeristé; 1969.
- [14] Torres J, Jonkers J, van de Sande MJ, van der Mullen JJAM, Gamero A, Sola AJ. *Phys D: Appl Phys* 2003;36:L55–9.

Marco A. Gigosos

*Departamento de Óptica, Facultad de Ciencias, Universidad de Valladolid, 47071 Valladolid, Spain*

18 April 2006

Manuel Á. González

*Departamento de Física Aplicada, E.T.S.I. Informática, Universidad de Valladolid, 47071 Valladolid, Spain*

*E-mail address: [manuelgd@termo.uva.es](mailto:manuelgd@termo.uva.es)*