Stark splittings experiment of electronically excited states of indole derivatives

Josefin Rolf, Christian Brand, Martin Wilke, and Michael Schmitt

Heinrich-Heine University, Institute for Physical Chemistry I, 40225 Düsseldorf, Germany
Tel.: +49 211 81 13219, Fax: +49 211 81 15195
E-mail: Josefin.Rolf@hhu.de

Rotationally resolved electronic spectra of several indole derivatives in a homogeneous static electric field are presented. From the analysis of the observed Stark splittings the electric dipole moments in the S_0 and S_1 state are elaborated. This is of great interest regarding the electronic nature of the excited states of indole derivatives. In general, the photophysics in the low energy regime of indole is governed by two excited singlet states, called the ^1L_a and the ^1L_b in the nomenclature of Platt [1] depending on the orientation of the transition dipole moment. They may change their energetic order due to the influence of substituents. For several derivatives an assignment of the electronic nature is ambiguous, as the excited state seems to be a mixture of the two possible states. However, there is a pronounced difference in the magnitude of the permanent dipole between the ^1L_a and the ^1L_b state. Hence, the excited state dipole moment is a very valuable piece of information if the nature of the excited singlet state is to be determined.
The first results for several derivatives of indole are presented and discussed.

[1] J. R. Platt, *Journal of Chemical Physics* **1949**, 17, 484.