

**Diagnostics of non-thermal processes in chromospheric flares:
I. $H\alpha$ and CaII K line profiles of an atmosphere bombarded by
hecta keV electrons**

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Abstract

The significance of non-thermal excitation and ionization of hydrogen and ionized calcium, by an electron beam, on the line profiles of $H\alpha$ and CaII K lines has been investigated. Non-LTE $H\alpha$ and CaII K line profiles have been calculated for the temperature distributions of semi-empirical flares models F_1 and F_2 (Machado et al. 1980). For reasonable values of the beam energy flux and power index, the hydrogen lines are greatly strengthened and broadened, and an obvious central reversal appears. The effects are weaker for the CaII K line. These effects can be used to diagnose electron beam bombardment during a solar flare, especially at its early phase. Any semi-empirical flare model that does not take into account non-thermal effects will overestimate the heating of the solar atmosphere.