Poster

Splinter HiRes

Scattering theory of Paschen-Back effect: application to Li I 6708 Å doublet

Sowmya K.[1], Nagendra K. N.[2], Sampoorna M.[2], Stenflo J. O.[3,4]

[1] *Max Planck Institute for Solar System Reseach, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany*
[2] *Indian Institute of Astrophysics, Koramangala, Bangalore 560034, India*
[3] *Institute of Astronomy, ETH Zurich, CH-8093 Zurich, Switzerland*
[4] *Istituto Ricerche Solari Locarno, Via Patocchi, 6605 Locarno-Monti, Switzerland*

The diagnostically important Li I D lines in the Second Solar Spectrum result from the transitions between the fine structure states and are separated by 0.15 Å. Since the Li atom possesses a finite nuclear spin, it undergoes hyperfine structure splitting, and hence is governed by the quantum interference processes that take place among the magnetic substates belonging to different fine and hyperfine structure states. This interference gets modified in the presence of a magnetic field, and leaves its signatures in polarization which can serve as tools to study the vector magnetic field in the solar atmosphere. With this motivation, we develop the polarized redistribution matrix including Paschen–Back effect, based on the Kramers–Heisenberg scattering matrix approach, and apply it to model the polarization profiles of the Li lines observed in the Sun. We make use of the last scattering approximation which is based on the concept that the polarization of the emergent radiation is generated in the last scattering event, before the radiation escapes from the atmosphere. We present a comparison of the quiet Sun observations of the linear polarization profiles of Li D lines with the theoretical profiles computed using our simple modeling approach.