Electric field diagnostics with the H-epsilon line

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Electric fields experienced by atoms play a central role in magnetic diffusion, magnetic energy dissipation, and moreover particle accelerations. Using the newly commissioned US National Science Foundation's Daniel K. Inouye Solar Telescope (DKIST), we observed NOAA active region 12995 on February 23rd, 2022, in three spectral ranges, i.e., 397 nm, 630 nm, and 854 nm, using the Visible SpectroPolarimeter (ViSP). We successfully obtained Stokes spectra of Ellerman bombs, transient brightening in the lower chromosphere associated with magnetic reconnection. At the Ellerman bomb, we discovered a broadband circular polarization in a Balmer line of the neutral hydrogen at 397 nm, H epsilon, that is consistent with the presence of an electric field. To infer the electric field, we made a database of synthesized Stokes profiles, using a numerical code that implements a formalism of scattering for the hydrogen lines in the presence of magnetic and electric fields (Casini 2005). In this presentation, we will describe the details of the database and discuss future perspectives for developments of inversion codes.