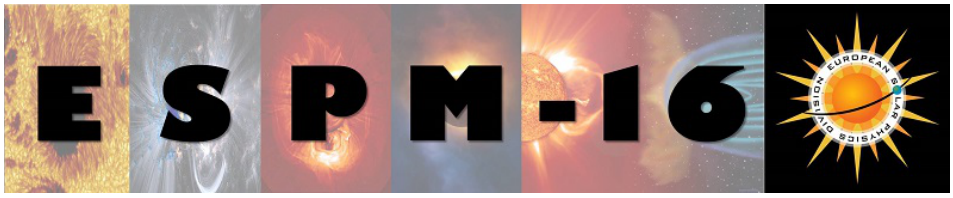

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On the inference of electric currents in the solar photosphere

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Electric currents play a very important role in the energy balance of the solar atmosphere as they dissipate the energy stored in the magnetic field. In addition, electric currents can be used as proxies of non-potential magnetic fields, which are prone to produce enhanced chromospheric and coronal activity. Most previous measurements of electric currents have been limited to j_z. In this contribution we present a new method, based on the inversion of the radiative transfer equation for polarized light with magnetohydrostatic constraints (the Firtez-dz inversion code), that is able to reliably retrieve the three components of the electric current vector **j**. In order to study to which accuracy we can determine electric currents we employ 3D MHD simulations to produce synthetic spectropolarimetric observations (i.e Stokes vector) via the forward solution of the radiative transfer equation. We then apply our newly developed inversion code to retrieve the electric currents from those synthetic observations and compare our inferences with the currents present in the MHD simulations. Our analysis shows that our method infers **j** within a factor or 2 of the original values in the solar photosphere.

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