

## **Bayesian Inversion of Stokes Profiles**

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Inversion techniques are the most powerful methods to obtain information about the thermodynamical and magnetic properties of solar and stellar atmospheres. During the last years, several highly sophisticated inversion codes have been developed and applied to spectro-polarimetric observations. Since the majority of these inversion codes are based on the optimization of a complicated non-linear merit function, no reliable and statistically well-defined confidence intervals can be obtained for the parameters inferred from the inversions. We present an inversion code based on bayesian techniques that efficiently samples the posterior distribution using a Markov Chain Monte Carlo method, allowing us to give statistically well-defined confidence intervals for the inferred parameters. We focus on the Milne-Eddington approximate solution of the radiative transfer problem and we illustrate the properties of the code with the aid of different problems.