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GESBAYES

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Abstract. This project will derive astrophysical parameters from the Gaia-ESO spectra using a new bayesian approach. This approach is based on a PCA spectral emulator, a MCMC sampler and a gaussian-mixture approach. This philosophy behind this method is being recently introduced in the literature and it has been tailored to the Gaia-ESO analysis by the proponents. The aim is to introduce the results obtained by this approach in the final advanced products of the Gaia-ESO survey using priors derived by Gaia.

1. Introduction

Purpose of this project is the application of a new bayesian approach for the inference of Astrophysical parameters from optical spectra at resolution at $R = 17000$, such as those obtained by the GIRAFFE spectrograph of the FLAMES facility.

Studying the competitiveness of the MARCONI KNL system in MCMC approaches for spectroscopic inference problems turned out to be an important part of the project. The initial difficulties in generating optimal configuration files for the problem at hand have caused delays that prevented us to contribute to the sixth and final data release of the Gaia, as planned. Nevertheless, the project has been pursued as a comparison with other methods used in the Gaia-ESO surveys as well as a bed-test for the application of the method to Gaia spectrophotometry.

We found that the KNL system is advantageous with respect to other systems used once a fine tuning of the computation strategy is implemented, but most importantly, an appropriate optimisation of the configuration files.

The project had to be suspended because of lack of dedicated fundings. It is planned to restart the project in case dedicated funding will be available. The results obtained within this project using the MARCONI KNL system are discussed in details in Marcellino (2018).

This project did not worked out as an incubator for further larger project, ISCRA or PRACE. Having obtained computing time within the CINECA-INAF MoU allowed us to have a continuity in the tests carried out using other INAF computational facilities within the CHIPP project, comparing the MARCONI KNL performances with other HPC facilities in Astrophysical Parameters inference from spectroscopy and MCMC model fitting.

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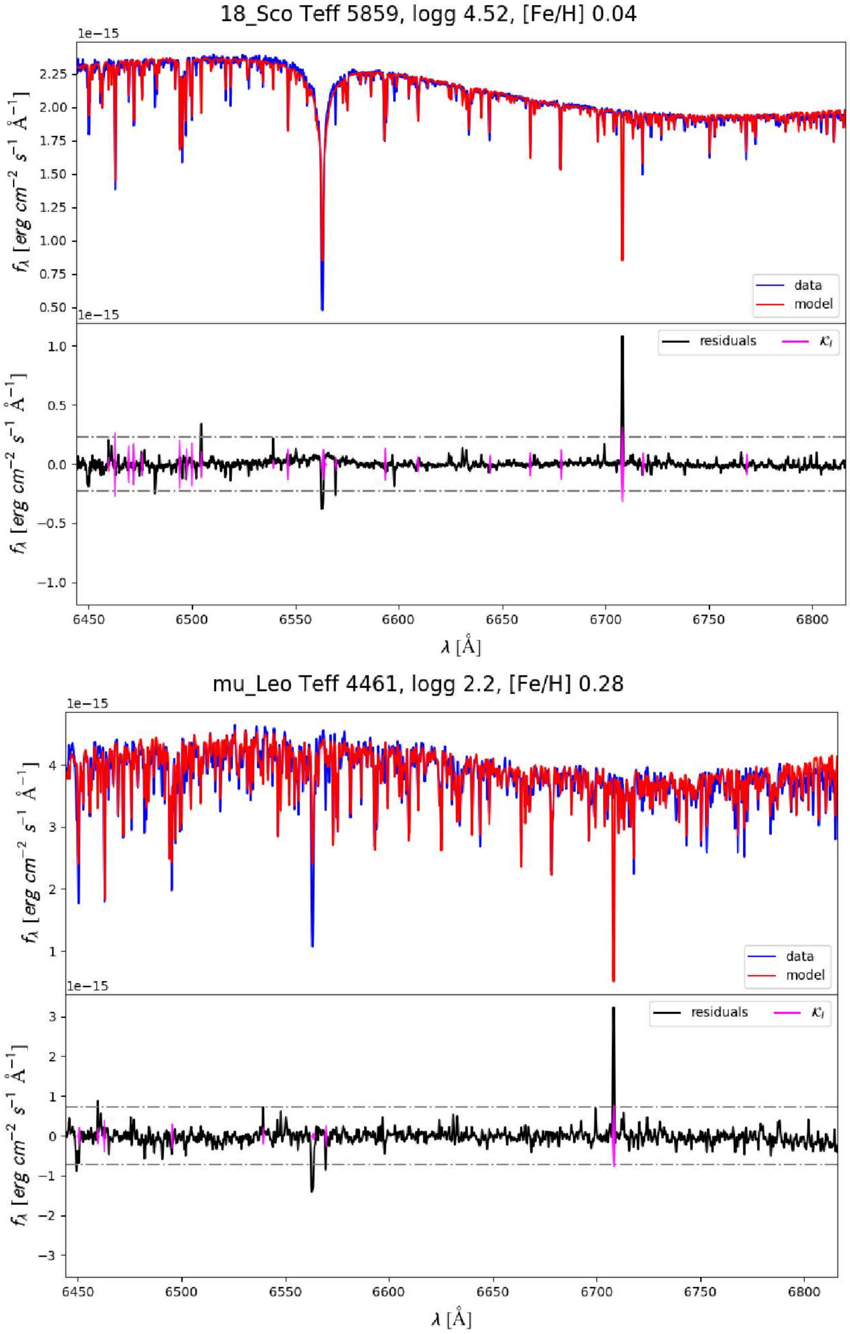

Fig. 1. Top: Sample MCMC fit of a 18 Sco spectrum affected by imperfect removal of the blaze function. Bottom: Sample MCMC fit of a spectrum of the cool giant Mu Leo affected by imperfect removal of the blaze function.

References

Marcellino, C. 2018 Spectroscopic inference with imperfect models, Master thesis at University of Catania