



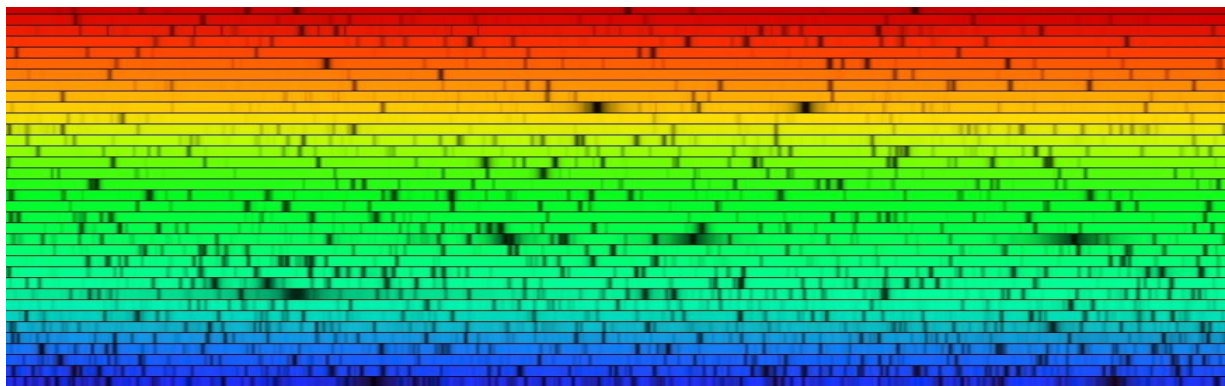
BalticGrid-II Project

Stellar spectra modeling

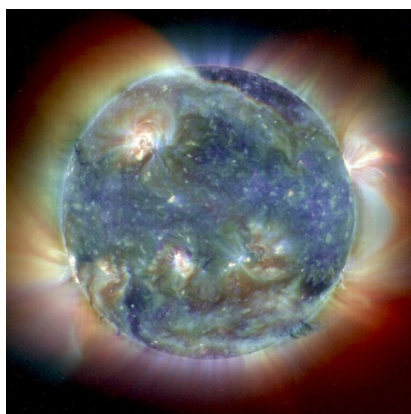
The SYNTSPEC application

Our Sun is located in a stellar system called the Milky Way Galaxy. We know today that our Galaxy is similar to many other galaxies and these are the major structural units of the Universe. Knowledge of the chemical composition and chemical evolution of the Galaxy is crucial in understanding of the Galaxy formation, structure and evolution.

The chemical evolution of the Galaxy is mostly studied by analyzing a chemical composition of stars. The detailed chemical composition of stars can only be determined by stellar spectra. The light of distant stars reaches our planet and is collected by telescopes and decomposed into spectra by spectrographs. Various absorption lines of different elements are seen in spectra and carry a lot of important information about stellar fundamental parameters and their interiors.



Solar spectrum example (NOAO)



The composite image of the Solar atmosphere (SOHO)

Within the framework of the BalticGrid project the Stellar Spectroscopy group of the Institute of Theoretical Physics and Astronomy of Vilnius university has upgraded and gridified a program package for the synthetic spectra modeling and is using it for:

- Chemical analysis of Galactic Red clump stars
- Chemical analysis of open clusters in the Galactic disk
- Investigation of chemical evolution of the Galactic thick disk
- Chemical analysis of stars in neighboring galaxies
- Analysis of chromospherically active stars

The SYNTSPEC is a good example of an application that benefits usage of the Grid because of the need of powerful computing resources and high network throughput. In our future plan is the analysis of stellar spectra to be provided in great numbers by the GAIA space mission of the European Space Agency (ESA).



The SYNTSPEC application provides a possibility to calculate stellar synthetic spectra.

It requires to select several input parameters for calculations: the number of spectra to be calculated, stellar atmosphere model, input file of atomic data, range of the spectrum, parameters of the instrumental profile convolution, the compiler (g77 or Ifort), etc. The user should not care about technical SH and JDL files.

For the preparation of the grid input files the generation script is used.

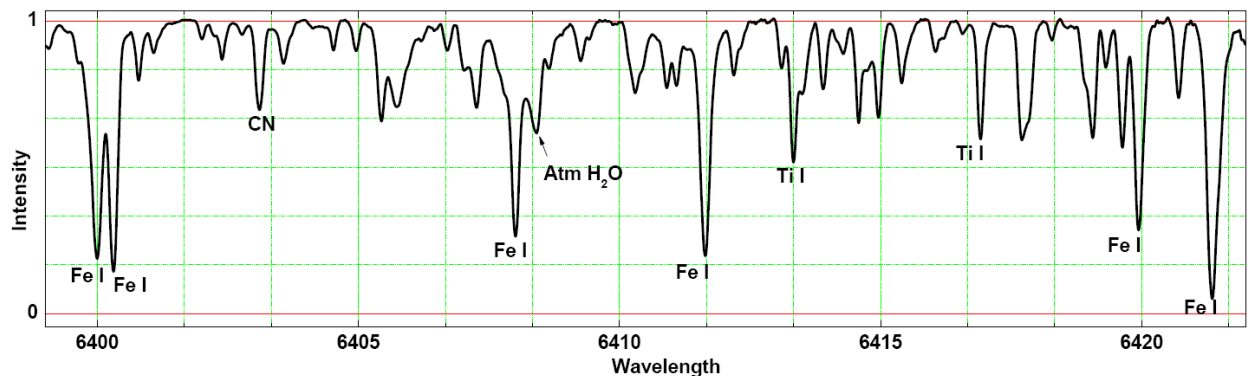
The job submission is provided by the submission script. It automatically submits any number of processes to the provided clusters.

An output of the application is the ASCII file that is downloaded by the traditional grid commands.

The Migrating Desktop and GRIDCOM versions are providing the special user interface. These versions give all command line functionalities and a

The submission dialog on the GRIDCOM interface

possibility to control the process with the user friendly dialog system. The users can make the SYNTSPEC spectra modeling without special knowledge of the command line middleware interface. The output is compatible to Virtual Observatory tools for further analysis.



The visualization of a small part of the stellar spectrum. The elemental line profiles are seen, some of them are identified on the picture

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