

CASSIS - Web based tools for the analysis of astrophysical spectra

Adam D. Walters¹, Alain Klotz¹, Emmanuel Caux¹
and Jacques Crovisier²

¹Centre d'Etude Spatiale des Rayonnements,
9 avenue du Colonel Roche - B.P. 4346, 31028 Toulouse Cedex 4. France
email: walters@cesr.fr

²Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique, Observatoire de
Paris-Meudon, Bt 2, F-92195 Meudon. France
email: Jacques.Crovisier@obspm.fr

Abstract. Future instruments for submillimeter and FIR astronomy like the Herschel Space Observatory and ALMA will make available high-resolution wide-frequency spectral surveys of the interstellar and circumstellar media. The CASSIS (Centre d'Analyse de Spectres Infrarouges et Submillimétriques) project aims to facilitate the analysis of these spectra by a maximum number of interested researchers. We will give a demonstration of the present state of CASSIS software which is beginning to be made available for testing and validation through the web.

By connecting to the CASSIS server a user will be able to visualise a synthetic spectrum created from a choice of models and associated parameters and compare this simulation with the observations. By choosing a template closest to that of the object being observed, the user will obtain a set of starting conditions including the principal chemical species, their abundance and linked physical parameters. Various computer tools will then allow the inversion of the spectra to obtain the best set of parameters. In order to run the model chosen the CASSIS server will have access to a variety of different databases and will automatically transform this data into a common format. As of May 2005, two spectroscopic data bases (JPL and CDMS) are periodically consulted and combined on the server allowing rapid injection into the models. Access to bases giving collisional parameters is planned in the near future.

At this time two models are available: a general Local Thermal Equilibrium model with a correction for the optical depth and a specialised model for comets written by J. Crovisier. Two working modes can be used: (1) a line-by-line mode that steps automatically from one transition of a given species to the next allowing a comparison between the predictions and the observations to be made for each molecular species; (2) a sum mode which shows the convoluted spectra of a variety of species. For the LTE model it is possible to create interactively a rotational diagram to determine N and T for each species. For the inclusion of other models three possibilities exist: (1) Models or their predictions will be added directly to the server or (2) accessed by CASSIS via the web; (3) a model could use the CASSIS infrastructure after being fed in on-line through a standard form by the user. It is hoped to carry out (1) and (2) with the help of collaborators. We are presently working on inclusion of an LVG model.

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