

## AUTOMATIC ACCESS TO BASECOL DATABASE AND SCIENTIFIC APPLICATIONS

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**Abstract.** Several services have been implemented in order to automatically access data provided by the Basecol database (<http://www.obspm.fr/basecol>). These services allow interoperability with different applications, such as various numerical codes (PDR code <http://aristote.obspm.fr/MIS>, MOLPOP code), spectral analysis softwares (MAGIX) and spectroscopic databases (CDMS/JPL). More generally our services will allow any user to obtain updated version of our database on their laptop.

The basecol database provides numerical and bibliographic data for the collisional excitation of molecules by He, H and H<sub>2</sub>, combined with an access to customized spectroscopic data from CDMS and JPL.

### 1 Introduction

BASECOL (<http://www.obspm.fr/basecol>) is devoted to collisional ro-vibrational excitation of molecules by colliders such as atom, ion, molecule or electron. The database is composed of several parts:

- a status page with information about the needs for astrophysics, the current calculations and experiments being carried out, the possibility to contact the relevant groups.
- a bibliographic database (papers are read and associated to very precise keywords given back to the user in the query response)
- calculated collisional rates
- graphical visualization of collisional rates
- fitted and analytic functions of some of the collisional rates and the associated coefficients
- information on the methods used in the calculation of cross sections and rate coefficients
- energy levels of the molecules (coming from spectroscopic databases or used in the theoretical calculations)

### 2 Services presentation

Several services are now available. They correspond to the needs of various users and applications :

**DALIA dedicated service** : this is an implementation of the SLAP protocol defined by the IVOA (currently in version 0.5). It returns a list of Lines contained in a VOTable. There are 1 compulsory parameter (the wavelength interval) and 2 other parameters that can be used to get more precise results (the name of the molecule and its symmetry). This a collaborative project with F. Boone (LERMA) and P. Schilke's group from MPIR, Boon.

Service URL : <http://amdpo.obspm.fr/asap0.5/transitions.php?>

**PDR Code dedicated service** : this service returns fitting coefficients and energy tables available in Basecol for all collisions concerning given target and collider. This a collaborative project with F. Le Petit (LUTH, Paris Obs.).

Service URL : [http://amdpo.obspm.fr/basecol\\_cgi/getCollisionsList\\_TV.php?](http://amdpo.obspm.fr/basecol_cgi/getCollisionsList_TV.php?)

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**MolPop dedicated service** : this service returns rate coefficients, energy tables, einstein coefficients available in Basecol for all the collisions concerning a given element. If no element has been specified, all the data contained in Basecol are returned (i.e. Einstein coefficients, energy levels are those of CDMS/JPL). This is a collaborative project with M. Elitzur (University of Kentucky, USA).

Service URL : [http://amdpo.obspm.fr/basecol\\_cgi/getCollisions.php?](http://amdpo.obspm.fr/basecol_cgi/getCollisions.php?)

### 3 Client Tools presentation

Two client applications have been developped specifically for the PDR code and MolPop services. They consist in Python scripts that automatically contact the Basecol services and get the VOTables. Those scripts use a XML configuration file that users can modify according to their needs.

The most interesting aspect of those tools is that they automatically generate ASCII output files in addition to the VOTables. The format of the ASCII files has been designed so that they can be directly used by the applications (the PDR code and MolPop).