Planetology in VO: Workflow for fast and simple analysis of Elodie spectra

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A) INTRODUCTION

Study of exoplanets: Need a tool for fast search for signatures in large spectral data sets

Tools: Elodie, Simbad (via Elodie), exoplanet encyclopaedia, BASECOL, spectral analysis.

At this stage, preliminary in "home" format

Initially as an exercise for students

==> Workflow in frame of VO because of interoperability

Colours: Implemented To be implemented soon Selection by hand

B) BACKGROUND

θ**Detection of exoplanets by radial velocity method (Doppler shift)**

on 100 000 spectral lines on spectra (Mayor & Queloz),

spectral resolution: 6-7 m/s

θ**We propose to look on archived data**

with a fast global automatic search

More than 200 spectra from exoplanet search program

on Elodie (Mayor and Queloz)

http://atlas.obs-hp.fr/elodie/E.cgi?

C) WORKFLOW STEP BY STEP

1. Selection of the star: 51 Peg (known exoplanet) or other

2. Asking for existing Elodie spectra (40 for 51 Peg)
Elodie: Spectral Data Base, high resolution
More than 17 000 spectra on line

3. Download locally all existing Spectra of Elodie

4. Checking properties on Exoplanet encyclopaedia, updated daily
(period, stellar type, etc…) and with Simbad

5. Checking reference of spectral lines at http://amdpo.obspm.fr/
RO-VIBRATIONAL COLLISIONAL EXCITATION Database and Utilities

6. Spectral analysis for all spectra at 6042 A

7. Fit of 6042 A by a simple Gaussian:
=> Spectral shift for all downloaded spectra

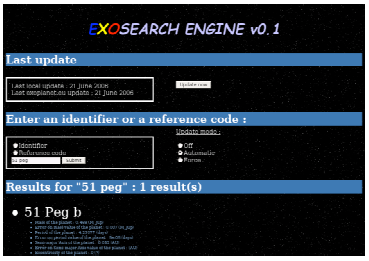
8. Periodicity check or search
- If known exoplanet: period, intensity of ΔV vs time.
- If not: ΔV versus time and search for periodicity

D) EXTENSIONS

- Results in VO Format
- More spectral data bases
- More applications
  - Asteroid search in DFBS
  - H2O in spectra
  - Temperature of exoplanets

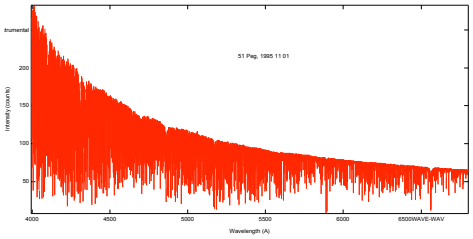
Etc…

Step 1: Web Service

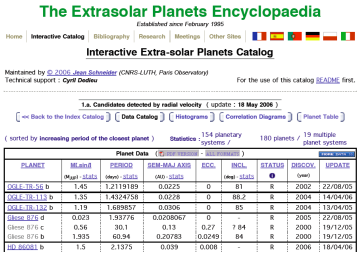


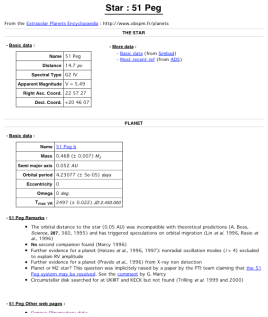
Step 2: php on elodie archive

Step 3: Downloading spectra from Elodie



Step 4: Exoplanet's properties at Exoplanet encyclopaedia

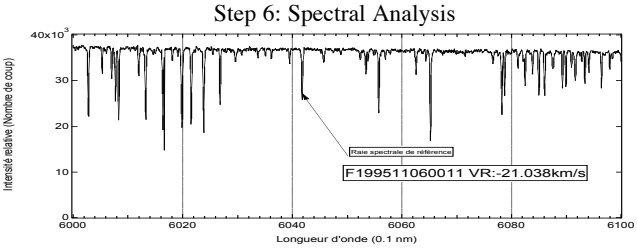




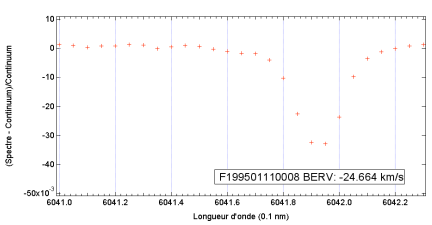
Step 5

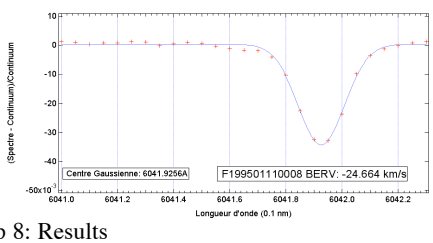
BASECOL

Step 6: Spectral Analysis

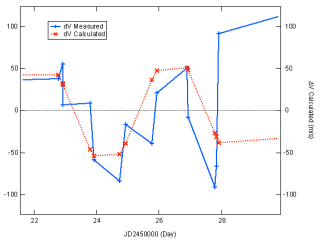


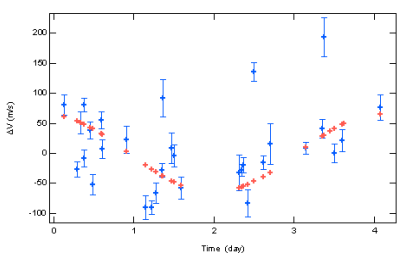
Step 7: Gaussian fit at 604.2 nm





Step 8: Results





Thanks: Elodie archive, BASECOL, VO-Paris Data Centre, VO-France, Exoplanet Encyclopaedia, Mayor et al.