VOSA tutorial

VOSA advanced

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3. Science case III : The impact of extinction on the physical parameters obtained from SED fitting

- **VO-Tools:** VOSA (v6.0).
- **Goal of the tutorial:** Visualization of the effects of interstellar extinction in the SED fitting.
- **Workflow:**

  - Open VOSA

    – *Step 1* – Go to VOSA (http://svo2.cab.inta-csic.es/theory/vosa/).

  - Tag "Files"

    – *Step 2* – Go to the ***Files*** tag. On the right hand side (section *Create a single object data file)*, type HD302505 in the *Obj. Name* box. Include a description (e.g. "third VOSA case". Including a description is not a compulsory step). Click ***Create***. The message "*HD302505 has been successfully uploaded*" will appear. Click ***Continue***.

  - Tag "Objects"

    – *Step 3 – Place the cursor on the **Objects** tag and then click **Coordinates**. The message "There are objects in your file without coordinates. Please, try to find them using Sesame", will appear. Click **Search for Obj. coordinates**.*

    – *Step 4* – Once Sesame has been used to find the coordinates of our object, we have to make them the "final" coordinates. To do so, we have to click ***Make all changes*** in the left panel (the one labelled as *Actions for all the objects in the file*). The Sesame coordinates will appear in bold in the *Final* column.

  - Tag "Build SEDs"

    – *Step 5* – Place the cursor on the ***Build SEDs*** *tag* and then click ***VO photometry***. Here we will be able to look for photometric information of our objects in different VO archives and services. In order not to slow down too much the tutorial, click ***unmark All*** and select only 2MASS, DENIS, WISE, Tycho-2, Stroemgren-Crawford (Paunzen 2015) and UBV (*Homogeneous Means in the UBV System*, Mermilliod 1991). Then, click ***Query selected services*** at the bottom of the page. Once this is done, a summary table with the VO photometry (in flux units) will appear.

  - Tag "Analyse SEDs"

    – *Step 6* – Place the cursor on the **Analyse SEDs** tag and then click **Chi-square fit**. Different grids of theoretical models covering different ranges of physical parameters

are displayed. For this tutorial select only the “Kurucz ODFNEW/NOVER models”. Click **Next: Select model params**.

– *Step 7* – In this window, we can define the range of physical parameters that will be used for the fit. Do not change the parameter range. Then, click **Make the fit**.

– *Step 8* – We will see now a summary table with the best fit results. Click on **Show graphs** to have a look at the graphics. The effective temperature obtained after the (very good) fitting is T_{eff}: 6500 K.

- Check with SIMBAD

– *Step 9* – Open SIMBAD (http://simbad.u-strasbg.fr/simbad/sim-fid). Type HD302505 in the Identifier box. Click **submit id**. This star has a B2 spectral type, which is inconsistent with the effective temperature derived from the SED fitting (T_{eff}: 6500 K). What is the problem here?

- Tag “Files”

– *Step 10* – Copy to your laptop the file “vosa_extinction.txt” available at: https://cloud.cab.inta-csic.es/index.php/s/YdtuvoBfyB63KS1

– *Step 11* – Go back to the **Files** tag and upload this file.

- Correct from extinction

– *Step 12* – Repeat *Steps 2-7*. Now we get T_{eff}: 32000 K with also a very good fit. What is causing the large differences in T_{eff} when this value is compared to that calculated in *Step 7*? The answer is extinction which has a strong impact on the SED shape. In the first case we were assuming no extinction while in the second case a value of Av: 2.4 is obtained from the SED fitting.

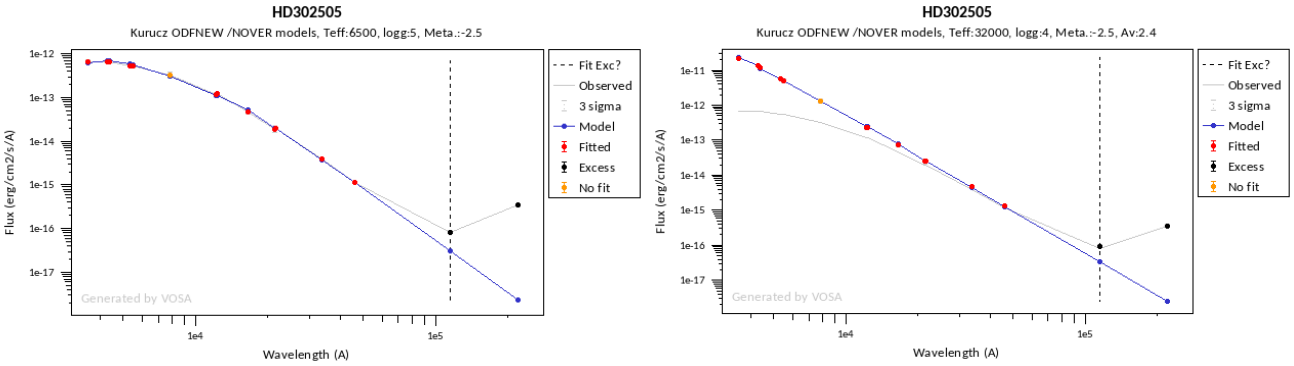

Figure 5. Plot of the SED fitting before and after correcting from interstellar extinction (*Step 12*).

- Tag “Help”

– *Step 13* – A detailed description of how VOSA estimates the interstellar extinction can be found in the ***Help*** tag.