

Appendix Report Vera C. Rubin Observatory Legacy Survey of Space and Time (LSST) Internship

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1 Introduction

This report regards the first access and use of the Rubin Science Platform to plot simulated data imported from OpSim or other means.

It describes the process needed to make light curves, color-color and color-magnitude diagrams using the portal aspect of RSP, and shows how to edit these plots as preferred, depending on the user's interests.

2 Import the Data

The portal aspect of RSP gives the user various choices to pick data from.

First of all there are TAP services (in "RSP TAP Search"), which include RSP and GAIA, as two examples.

The other possible data source is the external import ("Upload" in the platform); in particular this is the one I used.

There are plenty of articles publicly accessible in <https://ui.adsabs.harvard.edu/> It is possible to take data from.

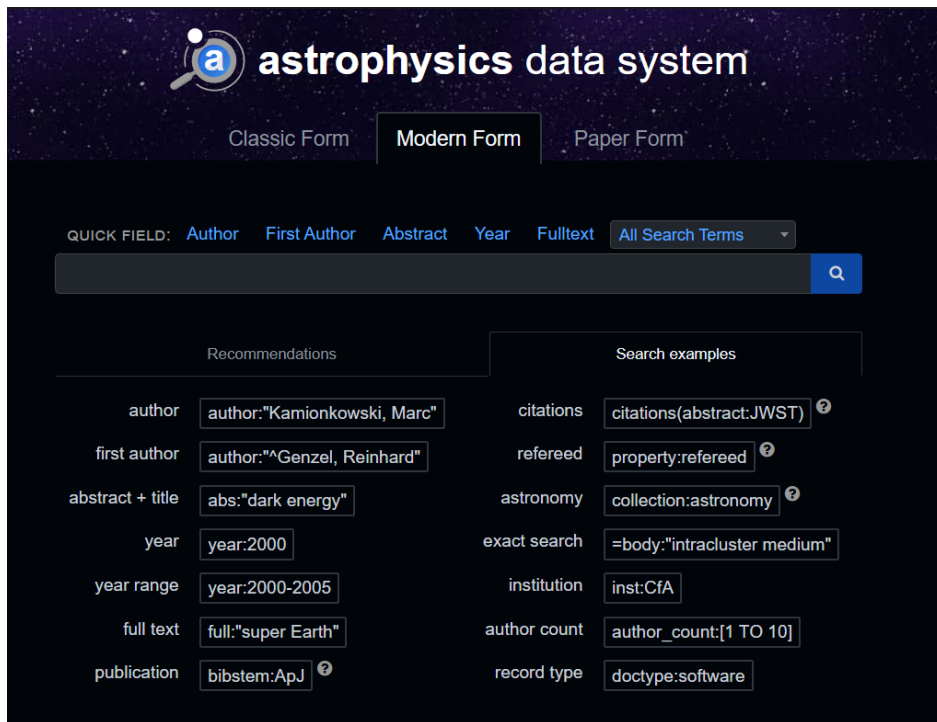


Figure 1: Screenshot from the opening page of the URL in [section 2](#).

In this search bar It is possible to use many **filters**, such as *first author*, *year*, *refereed* (these are in many cases the most useful filters).

As an example of search path, suppose We have to get this article:

<https://ui.adsabs.harvard.edu/abs/2014A&A..570A..82V/abstract>

in this case you could insert in the search bar:

author : "*^venuti*" *year* : 2014 *property* : *refereed*

and get this result:

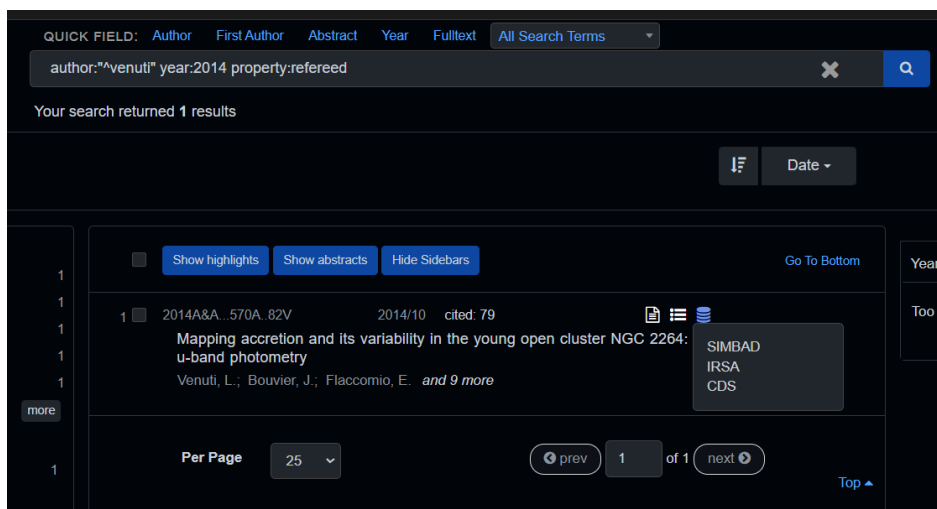


Figure 2: Search result.

Note that there are three symbols attached to the article link:

- The first one makes You download the article PDF file itself;
- The second one leads to all the citations and references;
- The third one (indicated in the [Figure 2](#)) is the one We are interested in, It links to the data archive needed.

By clicking "SIMBAD", It opens a new window where You have to click on the link in:

VizieR on-line data: <Available at CDS (J/A+A/570/A82): table2.dat table3.dat table4.dat>

and then click the link: [/A+A/570/A82/stars](#) in that page. At this point It is possible to choose which columns are useful for the research.

The screenshot shows the VizieR web interface. On the left, the 'Search Criteria' panel is visible, showing the target 'J/A+A/570/A82' and a list of tables including 'stars' and 'table4'. The main panel displays the 'Simple Target' and 'List Of Targets' tabs. The 'Simple Target' tab is active, showing the target name 'J/A+A/570/A82' and a description: 'Mapping accretion variability in NGC 2264 (Venuti+, 2014)'. Below this, a table of columns is shown with checkboxes for selection. The 'Simple Constraint' tab is also visible, showing a list of constraints applied to the columns.

Show	Sort	Column	Constraint	Explain (UCD)
<input type="checkbox"/>	<input type="radio"/>	recno		Record number assigned by the VizieR team. Should Not be used for identification. (meta.record)
<input checked="" type="checkbox"/>	<input type="radio"/>	Mon		⁽¹⁾ Object identifier (Note G11) (meta.id:meta.main)
<input checked="" type="checkbox"/>	<input type="radio"/>	A	(char)	A indicates an accreting member star (table4) (meta.ref.url)
<input checked="" type="checkbox"/>	<input type="radio"/>	RAJ2000	deg	⁽¹⁾ Right ascension (J2000) (pos.eq.ra:meta.main)
<input checked="" type="checkbox"/>	<input type="radio"/>	DEJ2000	deg	⁽¹⁾ Declination (J2000) (pos.eq.dec:meta.main)
<input checked="" type="checkbox"/>	<input type="radio"/>	umag	mag	u-band apparent magnitude (phot.mag:gm.opt.U)
<input checked="" type="checkbox"/>	<input type="radio"/>	gmag	mag	g-band apparent magnitude (phot.mag:gm.opt.B)
<input checked="" type="checkbox"/>	<input type="radio"/>	rmag	mag	r-band apparent magnitude (phot.mag:gm.opt.R)
<input checked="" type="checkbox"/>	<input type="radio"/>	imag	mag	i-band apparent magnitude (phot.mag:gm.opt.I)
<input checked="" type="checkbox"/>	<input type="radio"/>	St	(char)	CTTS (accreting) vs. WTTS (non-accreting) classification for members (Note 1) (meta.code.class)
<input checked="" type="checkbox"/>	<input type="radio"/>	SpT	(char)	Spectral type of the object (src.spType)
<input checked="" type="checkbox"/>	<input type="radio"/>	r_SpT	(char)	[sp] spectroscopic or photometric type (Note 2) (meta.ref:pos.frame)
<input checked="" type="checkbox"/>	<input type="radio"/>	Av	mag	⁽ⁿ⁾ [0/7.1] Visual extinction (phys.absorption:gm.opt.V)
<input checked="" type="checkbox"/>	<input type="radio"/>	Lbol	mag	Bolometric luminosity of the object (phys.luminosity)

Figure 3

Select them and then click [Save in CDSportal](#). It's useful to save the data file with the .fits format. At this point, using the portal in RSP, It is possible to upload this file to work with it.

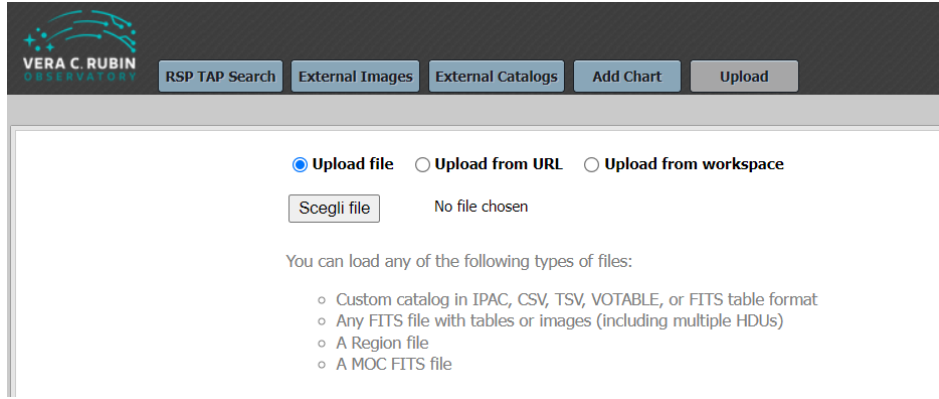


Figure 4: Upload section in RSP.

3 Work with the Rubin Science Platform

3.1 Use the Filter panel to select group of data

It is useful for various reasons to be able to select quickly a part of our data with given characteristics. In order to pursue this purpose, We can use the **Filter panel**.

Once this panel is selected, search bar appear for each column, letting Us decide which data point the program will select.

vizier_J_A+A_570_A82_stars_... x									
<input type="checkbox"/>	recno <i>int</i>	Mon <i>char</i>	RAJ2000 <i>double</i>	DEJ2000 <i>double</i>	umag <i>float</i>	qmag <i>float</i>	rmag <i>float</i>	imag <i>float</i>	St <i>char</i>
<input type="checkbox"/>				> 9.3 and < 10					
<input type="checkbox"/>	1	000007	100.47109	9.96755	15.85	14.807	14.674	14.192	c
<input type="checkbox"/>	2	000008	100.45248	9.90322	19.656	17.083	15.839	19.887	w
<input type="checkbox"/>	3	000009	100.53812	9.80134	18.208	16.043	15.011	14.532	w
<input type="checkbox"/>	4	000011	100.32187	9.909	18.548	16.808	15.531	14.535	c
<input type="checkbox"/>	5	000014	100.52772	9.69214	18.895	15.879	14.28	13.445	w
<input type="checkbox"/>	6	000015	100.53796	9.9841	19.427	16.172	14.589	13.786	w
<input type="checkbox"/>	7	000017	100.3833	10.0068	18.402	15.972	14.93	14.496	c
<input type="checkbox"/>	8	000018	100.3052	9.91909	19.311	16.526	15.366	14.613	w
<input type="checkbox"/>	9	000020	100.53849	9.73427	19.964	17.213	15.891	15.267	w
<input type="checkbox"/>	10	000021	100.24772	9.99594	18.174	15.835	14.81	14.452	c

Figure 5

In this example (Figure 6), a filter is applied to the DEC column, picking the points with $(9.3 < DEC < 10) \text{ deg}$, so that every graph is open during this process will remove all the other points outside the filter range.

Now the table will contain only the values We want, so select all the points (white square on the up left corner of Figure 6) and select the option "remove all filters".

You should be left with all the data, with all the previous points still selected.

This means that each graph on the page will mark the selected points (by default giving them a different colour).

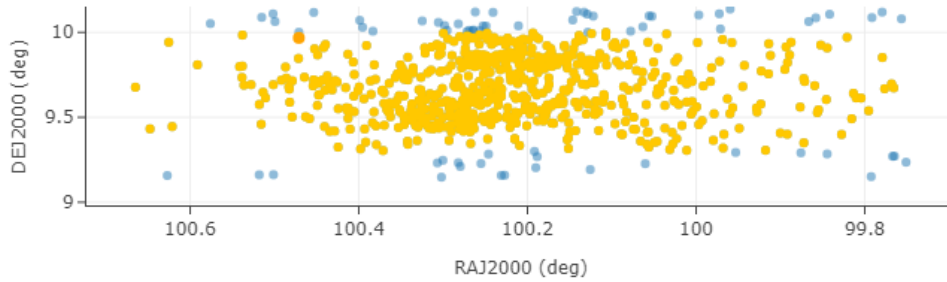


Figure 6: Spatial distribution of the points. The points with $(9.3 < DEC < 10) \text{ deg}$ are in **yellow**, whereas the other are in **blue**.

3.2 Create graphs in the RSP

To create new plots or modify the existing ones It's possible to use the "Add Chart" button on the portal aspect. It will open a window You can use to create and personalize every kind of plot with the columns of data imported.

Let's show as an example a Color-Magnitude Diagram, giving also some constraints.

Figure 7

These configuration produces the following graph:

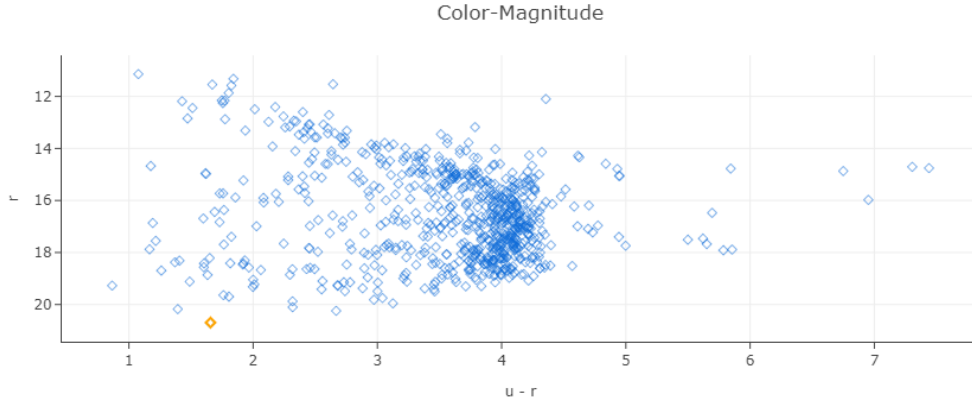


Figure 8: $(u - r, r)$ Color-Magnitude diagram.

Using similar steps to those described in [subsection 3.1](#), We can use a filter to select only the weak-line T-Tauri stars and highlight them. Furthermore, by clicking "Chart options and tools" It's possible to modify *max* and *min* values of both *X* and *Y* axes. By doing so We obtain:

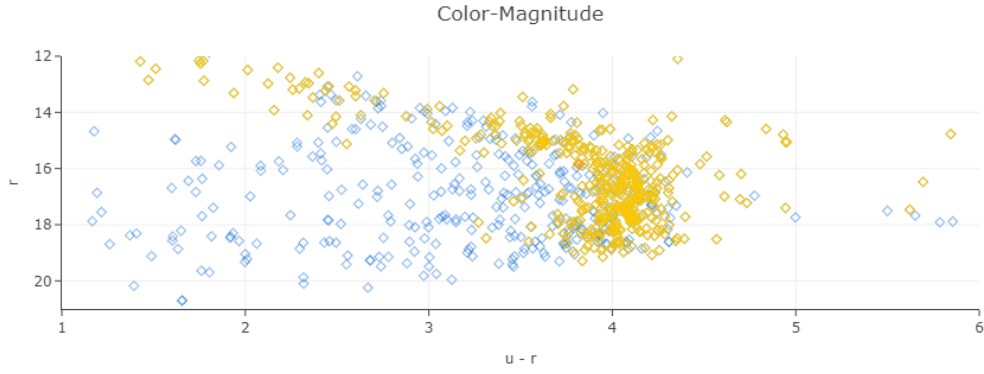


Figure 9: $(u - r, r)$ Color-Magnitude diagram (modified). The [yellow](#) points are the weak-line T-Tauri stars, all the others are in [blue](#).