

Usage of Gaia WebQL (Quick Guide)

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Four steps to create a Gaia plot

1. Select a plot type and (a) parameter(s) to be plotted
2. Specify criteria for data selection
3. Check the number of data used to make the plot and start to create the plot
4. Enjoy with your plot !

1. Select Data

Select a plot type with one of the radio buttons and select (a) parameter(s) or input (a) mathematical expression(s) (in \$) to be plotted. Default plot will create various types of plot, such as sky map in the equatorial and galactic coordinate frames, density maps in the equatorial and galactic coordinate frames, absolute magnitude vs distance, HR diagram, average velocity, etc.

All columns that start with "_" are derived by the JVO project.

The Galactocentric coordinate frame used in this database is defined as that the center of the Milky Way is its origin, the x-axis toward the north galactic pole, and the y-axis toward the Sun. The coordinate of the Sun is set to (8.3kpc, 0kpc, 0.027kpc) in the Milky Way at the Sun was set to -220 km/s. The peculiar velocity of the Sun was set to (vx, vy, vz) = (11.1kms, 12.24kms, 7.42kms).

Refer to the external site [Gaia Column Descriptions](#) for a complete description of the columns given in the Gaia source catalog.

Default

Custom

1D Histogram of or expression e.g. $\text{phot_g_mean_mag} + 5.0 + 5 \cdot \log(\text{parallax}/1000.)$

2D Histogram of vs

Scalar field of or in coordinates of

Vector field of in coordinates of

X range / bin number xmin: auto xmax: auto xbin: auto
Y range / bin number ymin: auto ymax: auto ybin: auto

2. Query Condition

All columns that start with "_" are derived by the JVO project.

Refer to the external site [Gaia Column Descriptions](#) for a complete description of the columns given in the Gaia source catalog.

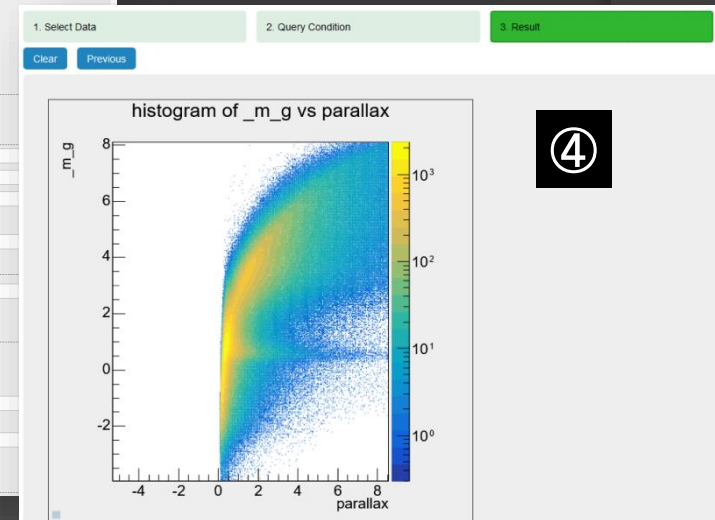
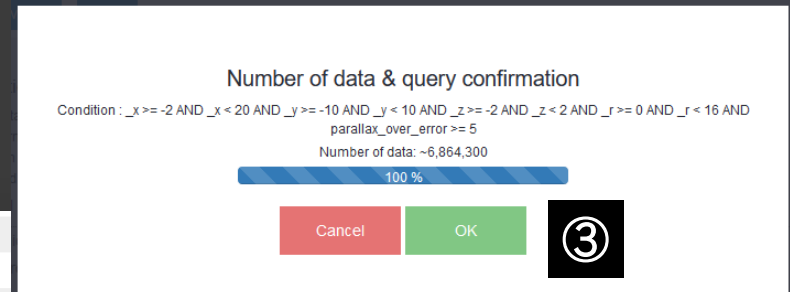
A short description will pop up when you put the cursor on the "?" mark.

Criteria unchecked in the checkbox are ignored.

(un)check all disable help

Search Region
Center Coord: 0 0 ICRS Radius: 1 deg

<input checked="" type="checkbox"/> $_x$?	<input type="text" value=">=-2"/> <input type="text" value="&lt; 18"/>	<input checked="" type="checkbox"/> $_y$?	<input type="text" value=">=-10"/> <input type="text" value="&lt; 10"/>	<input checked="" type="checkbox"/> $_z$?	<input type="text" value=">=-2"/>
<input checked="" type="checkbox"/> $_r$?	<input type="text" value=">= 0"/> <input type="text" value="&lt; 16"/>	<input type="checkbox"/> $_phi$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_m_g$?	<input type="text" value=">="/> <input type="text" value="<"/>
<input type="checkbox"/> $_vx$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vy$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vz$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $_vr$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vphi$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vz_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $_vx_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vy_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vz_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $_vr_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vphi_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $_vz_e$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $solution_id$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $designation$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $source_id$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $random_index$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> ref_epoch ?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $parallax_over_error$?	<input checked="" type="checkbox"/> <input type="text" value=">= 5"/>
<input type="checkbox"/> ra ?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> ra_error ?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $pmra$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> dec ?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> dec_error ?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $pmdec$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $parallax$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $parallax_error$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $pmra$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> pm ?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $pmra$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $pmdec$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>
<input type="checkbox"/> $pmra_error$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $pmdec_error$?	<input type="text" value=">="/> <input type="text" value="&lt;"/>	<input type="checkbox"/> $parallax_over_error$?	<input checked="" type="checkbox"/> <input type="text" value=">= 5"/>



Selection of a plot type and parameters to be plotted

- Select a plot type from four plot types. Click one of the radio buttons. Default plot type will create predefined plots (Sky map in RA-DEC and Galactic coordinates, HR diagram, histograms of velocity components, etc.)
- Select (a) column(s) or input mathematical expression of columns derived from original columns in SQL syntax. Explanation of the columns in Gaia source catalog is given in the external site which is linked from the “Column Description” link.
- You can also specify the plot ranges for X/Y axes and binning number for each axis (optional).
- You can save the form data by clicking the “save form” button and restore them by the “restore form” button.
- Click “Next” button to specify data selection criteria.

1. Select Data 2. Query Condition 3. Result

Clear Previous Next

Select Data

Select a plot type with one of the radio buttons and select (a) parameter(s) or input (a) mathematical expression(s) (in SQL syntax) to be plotted. Default plot will create various types of plot, such as sky map in the equatorial and galactic coordinate frames, density map in the galactocentric coordinates frames, absolute magnitude vs distance, HR diagram, average velocity, etc.

All columns that start with “_” are derived by the JVO project.

The Galactocentric coordinate frame used in this database is defined as that the center of the Milky Way is its origin, the direction of the z axis is toward the north galactic pole, and the x axis toward the Sun. The coordinate of the Sun is set to (8.3kpc, 0kpc, 0.027kpc). The circular velocity the Milky Way at the Sun was set to -220 km/s. The peculiar velocity of the Sun was set to (vx, vy, vz) = (11.1kms, 12.24km, 7.25km).
Refer to the external site [Column Descriptions](#) for a complete description of the columns given in the Gaia source catalog.

Default sky map in the equatorial and galactic coordinate frames, density map in the galactocentric coordinates frames, absolute magnitude vs distance, HR diagram, distribution average velocity, etc.

Custom

1D Histogram of or expression
e.g.

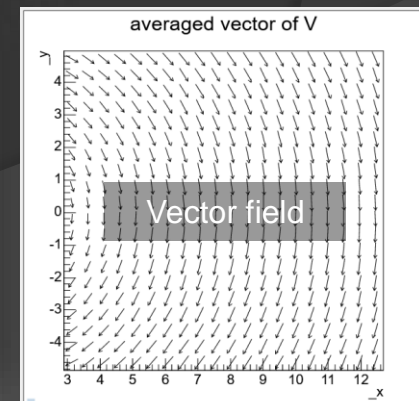
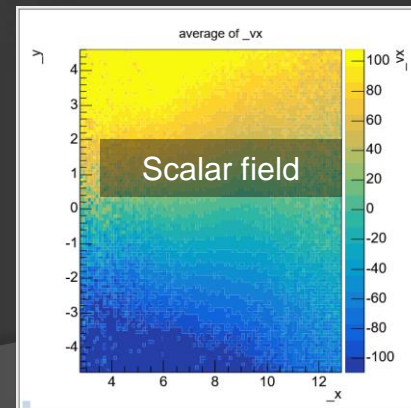
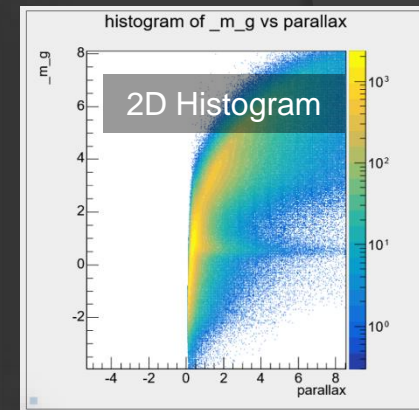
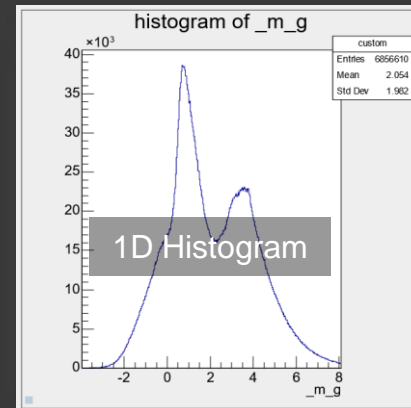
2D Histogram of vs

Scalar field of or in coordinates of

Vector field of in coordinates of

X range / bin number xmin: xmax: xbin:

Y range / bin number ymin: ymax: ybin:



Data selection criteria

- Specify criteria to be used for data selection. Only the criterion whose checkbox is checked is taken as an active one.
- Free form of SQL expression can be specified in the textarea labeled as “SQL condition” at the bottom of the page.
- Logical conjunction of all the active criteria is used to select data.

1. Select Data | **2. Query Condition** | 3. Result

Clear Previous Next

Query Conditions

All columns that start with “_” are derived by the JVO project. Refer to the external site [Column Descriptions](#) for a complete description of the columns given in the Gaia source catalog. A short description will pop up when you put the cursor on the “?” mark. Criteria unchecked in the checkbox are ignored.

(un)check all clear all disable help save form restore form

Search Region

Center Coord : 0 0 | ICRS | Radius : 1 | deg

<input checked="" type="checkbox"/> <u>x</u> ?	>= -2 & < 18	<input checked="" type="checkbox"/> <u>y</u> ?	>= -10 & < 10	<input checked="" type="checkbox"/> <u>z</u> ?	>= -2 & < 2
<input checked="" type="checkbox"/> <u>r</u> ?	>= 0 & < 16	<input type="checkbox"/> <u>phi</u> ?	>= & < & < & <	<input type="checkbox"/> <u>m_g</u> ?	>= & < & < & <
<input type="checkbox"/> <u>vx</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vy</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vz</u> ?	>= & < & < & <
<input type="checkbox"/> <u>vr</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vphi</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vze</u> ?	>= & < & < & <
<input type="checkbox"/> <u>vr_e</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vy_e</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vz_e</u> ?	>= & < & < & <
<input type="checkbox"/> <u>vr_e</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vphi_e</u> ?	>= & < & < & <	<input type="checkbox"/> <u>vze</u> ?	>= & < & < & <
<input type="checkbox"/> <u>solution_id</u> ?	>= & < & < & <	<u>designation</u> ?	-> & < & < & <	<input type="checkbox"/> <u>source_id</u> ?	>= & < & < & <
<input type="checkbox"/> <u>random_index</u> ?	>= & < & < & <	<input type="checkbox"/> <u>ref_epoch</u> ?	>= & < & < & <		
<input type="checkbox"/> <u>ra</u> ?	>= & < & < & <	<input type="checkbox"/> <u>ra_error</u> ?	>= & < & < & <		
<input type="checkbox"/> <u>dec</u> ?	>= & < & < & <	<input type="checkbox"/> <u>dec_error</u> ?	>= & < & < & <		
<input type="checkbox"/> <u>parallax</u> ?	>= & < & < & <	<input type="checkbox"/> <u>parallax_error</u> ?	>= & < & < & <	<input checked="" type="checkbox"/> <u>parallax_over_error</u> ?	>= 5 & < & < & <
<input type="checkbox"/> <u>pm</u> ?	>= & < & < & <	<input type="checkbox"/> <u>pmra</u> ?	>= & < & < & <	<input type="checkbox"/> <u>pmdec</u> ?	>= & < & < & <
<input type="checkbox"/> <u>pmra_error</u> ?	>= & < & < & <	<input type="checkbox"/> <u>pmdec_error</u> ?	>= & < & < & <		

dr2_radial_velocity ? >= & < & < & < | dr2_radial_velocity_error ? | >= & < & < & < | dr2_rv_nb_transits ? | >= & < & < & < || dr2_rv_template_teff ? | >= & < & < & < | dr2_rv_template_logg ? | >= & < & < & < | dr2_rv_templatefeh ? | >= & < & < & < |
l ?	>= & < & < & <	b ?	>= -100 & < & < & <		
ect_lon ?	>= & < & < & <	ect_lat ?	>= & < & < & <		
SQL condition ?					

- The columns whose name start with “_” are column derived from the original Gaia source catalog by JVO project.

x, y, z : Galactocentric coordinates in cartesian.

r, phi, z : Galactocentric coordinates in cylindrical.

m_g : absolute G band magnitude.

vx, vy, vz : velocity components in the Galactocentric cartesian coordinate frame.

vr, vphi, vz : velocity components in the Galactocentric cylindrical coordinate frame.

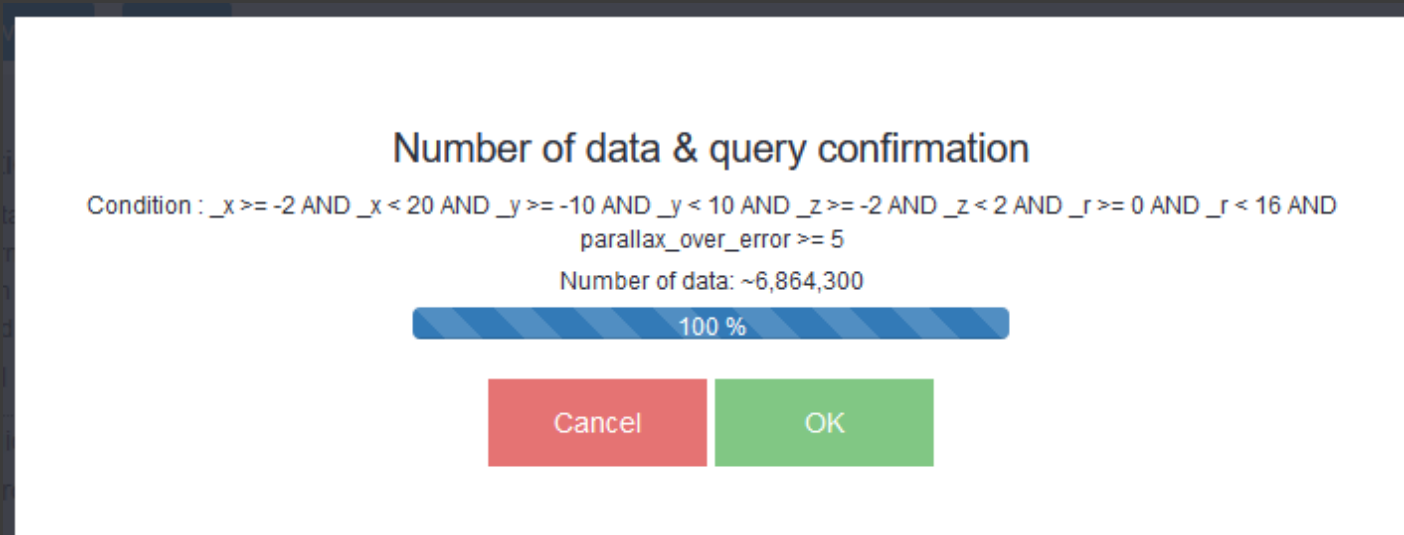
v?e : error of the corresponding velocity component.

The Galactocentric coordinate is defined as that the center of the Milky Way is its origin, the direction of the z axis is toward the north galactic pole, and the x axis toward the Sun. The coordinate of the Sun is set to (8.3kpc, 0kpc, 0.027kpc). The circular velocity the Milky Way at the Sun was set to -220 km/s. The peculiar velocity of the Sun was set to (vx, vy, vz) = (11.1kms, 12.24km, 7.25km).

- By hovering the cursor on a “?” mark beside the column name you can see the brief description of the column. By checking the “disable help” check box you can disable to pop up the description.
- Click “Next” button to check the approximate number of data satisfying the specified criteria.

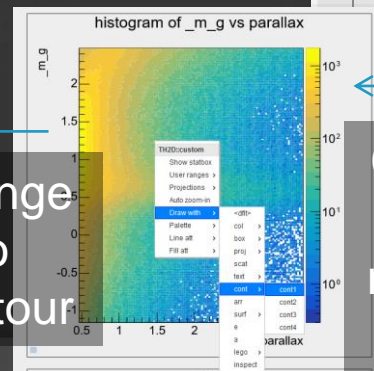
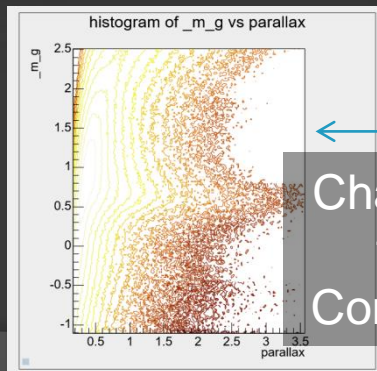
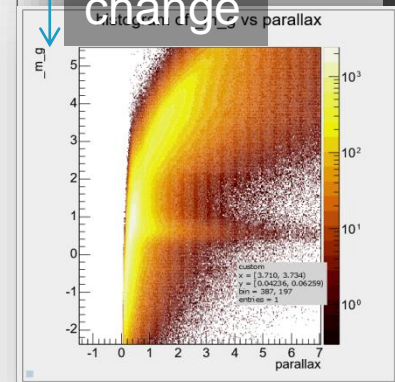
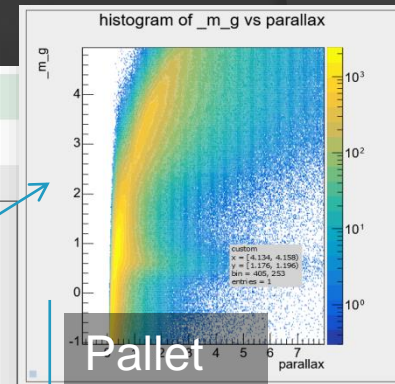
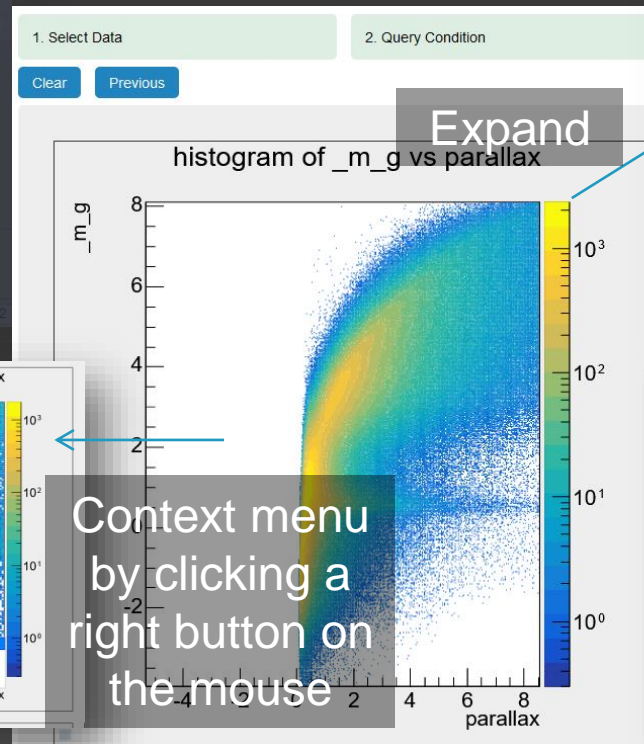
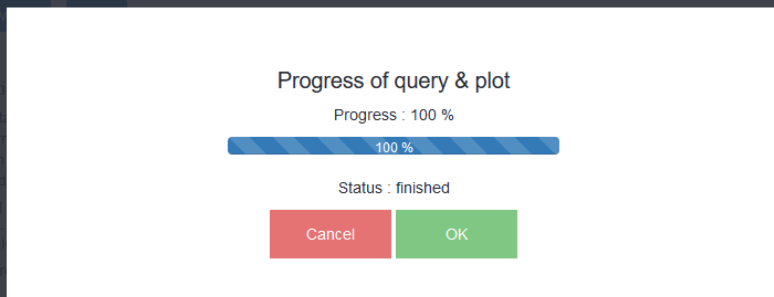
Confirmation for creating a plot

- The number of data satisfying the specified criteria is counted, which takes up to several tens seconds depending on the criteria you specified and status of the backend DBMS.
- This number is an approximate one, as it is counted on the table whose size is reduced to 1/100 of the original Gaia source catalog.
- If its OK, click “OK” button to create a plot.



Ready for looking at the plot

- It takes up to several minutes, usually less than one minute, to create a plot.
- Click “OK” to look at the plot.
- The plot is drawn with “[JSRoot](#)” JavaScript library and is configurable interactively on your web browser.
- If you would like to create another new plot, click “Clear” button and restart from the “1st step”.

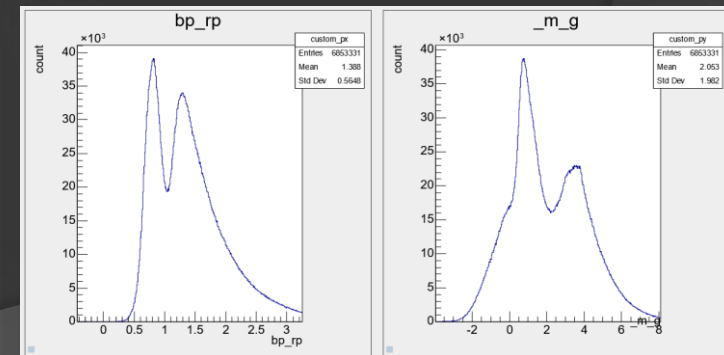
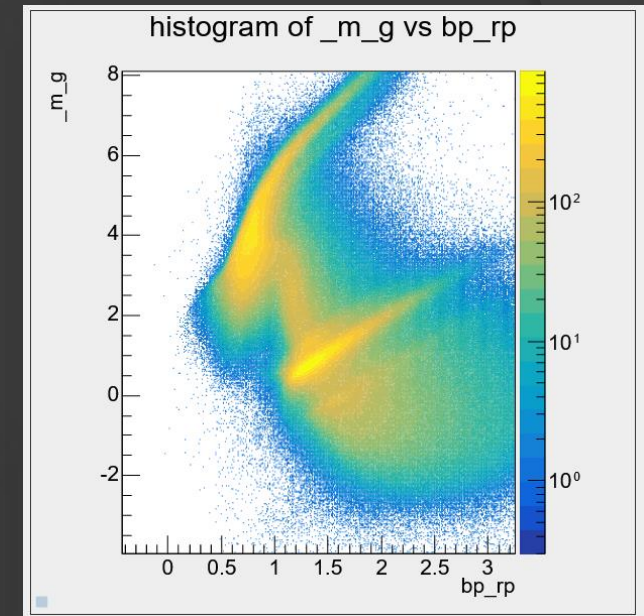
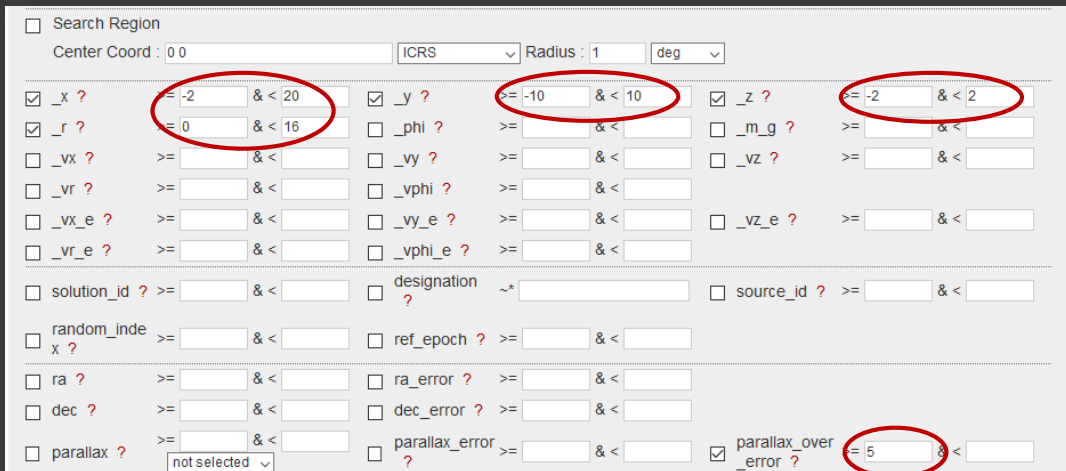


An example for plotting a color-magnitude diagram

1. Check “2D Histogram” at the “Select Data” step. Select `_m_g` (absolute G band magnitude) and `bp_rp` (B-R color) for y and x-axis. Then click the “Next” button.



2. At the “Query Condition” step, restrict the spatial region of Gaia sources to the range of `_x = -2 ~ 20`, `_y = -10 ~ 10`, `_z = -2 ~ 2`, and `_r < 16`, and select data with good parallax measurement by `parallax_over_error >= 5`. Then click the “Next” button.



3. Click OK at the “Number of data & query confirmation” dialog. Then click OK at the “Progress of query & plot” dialog. Then you will get three plots shown above.