

Partiview visualization tool – overview for bpvis

Partiview is generally intended to be run from some sort of command-line window. To make it convenient to use that way, you'll want to go through the **installation process** (see **Installation** below) – basically, to add partiview to your search path, so that if you create your own data and type “partiview mydata.speck”, it will find the program.

The **examples below** are configured to use a built-in copy of partiview, so you can see how it behaves by just clicking on some batch scripts or shell scripts.

Try some examples in the `partiview/examples` folder – hipmotion, hipchroma, sdss, cluster, etc. Under Windows, double-click on the .bat files there. Under MacOS or Linux, run the corresponding .sh files: open a Terminal window, cd to the `partiview/examples` folder, and type e.g. “./hipchroma.sh”. You can examine the scripts used to create each example – some in the subfolder of the same name, others under the “data” folder.

Note on running the examples on Windows:

- When you click on one or another of the “.bat” files (gear icons) under `partiview\examples`, recent Windows versions pop up a security warning that you're running a program from an untrusted source. If you trust me, click “More Info” to get a chance to say that you'd like to run it anyway. You only need to do this the first time you run each of the demo scripts.

For notes on each example, see `partiview-examples-blurbs.pdf` or `.doc`, included here.

Pointers to other information, documentation, software, etc, on partiview are on the web: <http://virdir.ncsa.illinois.edu/partiview/>

A typical partiview scene is described by a **.cf** file, containing commands to establish settings (brightness, color, placement, etc.), and **reading** one or several **.speck** files which contain 3-D data. Generally a scene includes some set of particles, with each particle having several named numerical attributes (“data variables”).

See the reference documentation, `partiview/doc/partiview.html` (or `partiview.pdf`). Chapter 3 describes the features of the interface (buttons, sliders, mouse interaction, etc.). Chapter 4 includes descriptions of control and data commands.

Quick orientation:

How to move around in partiview - in the default [o]rbit mode:

- ≡ **Left-mouse-drag** to rotate about the center-point (initially 0 0 0)
- ≡ **Ctrl-left-mouse-drag** to pan across the sky (rotate about the viewpoint), just like fly mode. So most common navigation can be done by staying in orbit mode.
- ≡ **Right-mouse-drag** (or on the Mac, **Option-mouse-drag**) flies into/out-of screen plane, at speed proportional to distance from center-point (i.e. exponentially)
- ≡ Generally, across all [o]rbit/[f]ly/[t]ranslate/[r]otate modes:
 - left-mouse-drag does something in the screen plane** (rotate, translate)
 - right-mouse-drag does something perpendicular to the screen plane** (roll, move forward/backward)
- ≡ **Hold down Shift-key** during left/right-mouse drag => 10x slower for fine control

Things keep moving if the mouse is still moving when you release it. Click to stop.

- ≡ **Middle-mouse-click (or "p" key)** picks object under cursor
=> reports position/name/other info.
- ≡ **Shift-middle-click (or "P" key)** picks object *and* sets **center-point** to be there

Typing commands into the text box:

You can always move mouse to click in text box

Or: press <Tab> key to cycle between the graphics window and the command text box.

So to enter a command, hit <Tab> until the cursor-bar appears in the text box.

Up- and Down-arrow keys scroll through command history.

Some common control-commands

You can type these “control commands” as-is into the partiview text box, e.g.

`color mass` (to derive particle color from a data variable named “mass”)

To put such a control command inside a script (.cf, .speck), you add an “eval” prefix to distinguish it from data:

`eval color mass`

In the below, [brackets] mark something that's optional. So if you see "censize [*size*]" then you might either type "censize 10" or just "censize".

slum	Show current scale-of-luminance value
slum *2.5	Multiply current slum by this (note no space after "**")
datavar	Show names and data-ranges of all named data variables
lum	Show which data-variable is mapped to luminosity
color temp 3000 6000	Map "temp" values in range 3000 ... 6000 to color using currently loaded colormap
jump	Report current viewpoint (camera position)
jump X Y Z Rx Ry Rz	Set camera position and orientation
center	Show current center-point coordinates
center X Y Z	Set center-point (initially 0 0 0)
censize [<i>size</i>]	Show or set radius of center-point red/green/blue crosshair
clip [<i>neardistance fardistance</i>]	Shows or sets the "clipping planes," the range of distances at which things can be seen – nothing nearer than <i>neardistance</i> nor farther than <i>fardistance</i> . Initially 0.1 and 2500. May need to be adjusted depending on the scene.
fovy [<i>degrees</i>]	Views or sets the angular field-of-view. Also, typing "v" or "V" in the graphics window will enlarge/shrink the field-of-view.
rdata file-containing-animation-path.wf	A .wf file describes an animation path – a sequence of camera viewpoints. Each line contains X Y Z Rx Ry Rz FOVY values. Press the "Play" button to play along it, or drag the "play" slider to scan through it, or press the Play button, or...
frame [<i>frameno</i>]	Jump viewpoint to numbered frame along previously-loaded animation path
play	Start playing along previously-loaded path

Data-selection commands:

`datavar` List names of data variables (as declared in **.speck** file)

`clipbox` *xmin,xmax ymin,ymax zmin,zmax*
(note no spaces around commas!!)
Only display particles lying within that box, hiding any others.

`clipbox` [*off|on*] Leave clipbox position intact but disable/enable clipping.

`thresh` *varname minvalue-maxvalue*

`thresh` *varname > minvalue*

`thresh` *varname > minvalue < maxvalue ...*

Only display specks with those value(s) / ranges

E.g. Hipparcos star data has

mv (apparent V magnitude as seen from Earth), and

colorb_v (B-V color). Then:

`thresh mv < 3` see only stars brighter than magnitude 3;

`thresh colorb_v -0.5 0.1` see only where $-0.5 \leq \text{color} \leq 0.1$

Some **data exploration commands**:

`every` [*N*]

With no argument, reports how many particles are loaded.

As “every N”, e.g. “every 3”, shows just every Nth particle – subsetting.

`bound` [*-w*]

Report coordinate bounds of loaded data: center, radius, as well as minimum and maximum on each coordinate.

With “-w”, reports world coordinates, after applying the “tfm” transformation associated with (that group of) data. Otherwise reports in the group's own coordinate system.

`hist` [*-n nbuckets*] [*-l*] *varname* [*min max*]

Print numerical histogram of values of that variable

(possibly over subsets selected by “clipbox”, “only=”).

By default, histogram buckets span its entire data range, unless min max given.

-n: use N histogram buckets (default 11)

-l: use log-spaced buckets (default linear)

Installation

What's needed is to add Partiview to the default search path, so that a command typed in a command-line window will know where to find it. How to do that depends on your operating system. The instructions below assume you just want to run the copy of partiview that was included in the **examples** folder. You might instead download it or recompile it from source; for that, see the <http://virdir.ncsa.illinois.edu/partiview> web page.

On Windows:

- Check where you unpacked the **partiview-bpvis.zip** file. For example, on my computer it was in:

C:\Users\stuart\Downloads\partiview-bpvis

- To that path, add “partiview\examples\bin”, so:
C:\Users\stuart\Downloads\partiview-bpvis\partiview\examples\bin
- Open the System control panel on Windows.
 - Right-click on the Windows icon at lower left screen corner.
 - If there's a System item in the menu that appears, click it.
 - If there's a Control Panel item, click that instead, and choose System from the panel that appears. Then ...
 - Click on Advanced System Settings. A “System Properties” panel appears.
 - Click on the Advanced tab.
 - Click on Environment Variables button at the bottom of the panel.
 - Under “System Variables”, scroll to “Path”.
 - Click on the very end of the (probably very long) value that appears. Use the right-arrow. Be sure not to type new text while the whole value is selected or you'll erase it – if you miss, press Cancel.
 - To that existing value, add a semicolon, followed by the path where partiview is – the one you determined above. E.g. you might add to the end of the path:
;C:\Users\stuart\Downloads\partiview-bpvis\partiview\examples\bin
 - Click OK, and OK, and OK (after being sure you didn't erase any of the existing path entries)

On MacOS (intel):

- You'll want to work in a Terminal window. If you don't have that in the Dock, find it under Applications → Utilities (and drag Terminal to the Dock, as you'll want it again). I'll assume you are using the “bash” shell in Terminal windows,

which is the default.

- Note where you unpacked the **partiview-bpvis.zip** package. For example, it might have been under
`/Users/stuart/Desktop/partiview-bpvis/`
- Use a text editor to create or edit the file (in your home folder, **not** on your Desktop) named:
.bash_profile
- Put into it this one line, changing the “`/Users/.../partiview-bpvis`” to the place you unpacked the .zip package, and adding “`/examples/bin`” after that:

```
export PATH="$PATH:/Users/stuart/Desktop/partiview-  
bpvis/examples/bin"
```
- After this, any new Terminal window you open should have “partiview” in its search path.
- Alternative: you can copy `.../partiview-bpvis/partiview/examples/bin/partiview.macosx` to `/usr/local/bin/partiview` (if you have root permissions). Or, you could create your own `~/bin` folder under your home directory, and copy `partiview.macosx` to `~/bin/partiview`. In the latter case, edit `.bash_profile` to add “`~/bin`” to your PATH instead, as in:

```
export PATH="$PATH:~/bin"
```

On Linux (x86_64)

- Similar to MacOS. You'll need to edit `~/.bash_profile` or `~/.bashrc`.
- Alternatively you can copy `.../partiview-bpvis/partiview/examples/bin/partiview.linux` to `~/bin/partiview` or similar.
- This binary was compiled under CentOS 6 (gcc 4.4)

For other platforms, you'd need to compile partiview from source, (see <http://viridir.ncsa.illinois.edu/partiview>) or contact Stuart Levy <slevy@ncsa.illinois.edu>.