




## Visualizing ACE3P results in ParaView



The SLAC Toolbar  in ParaView provides convenience and streamlined workflow. It automatically creates visualization pipelines, and reduces the amount of user input needed for certain common operations in visualizing ACE3P results. All toolbar functionality is also available through the traditional ParaView interface. The traditional interface also provides additional control and more advanced visualization features. This reference will concentrate mostly (but not entirely) on the SLAC Toolbar, which will be referred to as simply “the toolbar”.




The toolbar plugin is included in ParaView releases, but by default, it is not enabled. To **enable the SLAC Toolbar**, go to “Tools → Manage Plugins”. Select “SLACTools” and press “Load Selected” which loads the plugin for now. Then click on the SLACTools “+” and check the box by “Auto Load” so this plugin will default to always load.




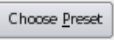

To **load data**, press the  button the toolbar. Within the window that pops up, press the  buttons to browse to the locations for the mesh (required), fields (optional), and particles (optional).

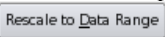
**Interaction with the 3d window** consists of dragging the mouse with specific mouse buttons pressed:


- Left: **rotate in 3d**
- Shift-left: **spin in the screen plane**
- Middle: **pan** (up/down/left/right on the screen)
- Right: **zoom** (up is away, down is towards)



To position the mesh on the screen in a canonical “**Z axis points to the right**” orientation, press the  button in the toolbar. (This is also useful for getting un-lost when the mesh has been accidentally moved out of view). To **change the center of rotation**, click the “Pick Center” button  above and to the right of the SLAC Toolbar, then click on the mesh where the new center of rotation should be.




The toolbar supports three **drawing styles**: Surface , surface with element edges shown in wireframe , and solid back with wireframe front . This last style is useful for seeing in through the outer surface to reveal detailed internal structure (e.g., complex coupler geometry, or internal arrows or slices).




To **scale the fields**, press  to rescale field colors based on maximum field magnitude across all loaded timesteps, or  to rescale the field coloring based on only the currently displayed timestep. For further control, select the intended surface in the pipeline browser, then press  to **edit the color map**. For other colormaps, or to select the rainbow colormap if it’s not already selected, press  and select the desired colormap. You may want to press  so that other filters (e.g., arrows) will use


the same color map. To **find out the maximum field magnitude** in the current timestep, press , and observe the value displayed after “Maximum:”.




To **animate** a mode, or a sequence of fields, or particles, use the VCR style buttons  which mean, respectively: go to first frame, go back one frame, play, go forward one frame, and toggle whether to automatically loop.



If fields have been loaded, to visualize **e or b field magnitude**, pressing either of the   buttons will switch the field coloring to the e or b field, respectively (this only works for portions of the visualization pipeline that were set up automatically by the SLAC toolbar, and will not affect anything manually added to that through the traditional ParaView interface, such as slices or cone/arrow glyphs; these must be set to the proper field type individually by hand).

To see a **line plot of field magnitudes along the z axis**, press . This plot will automatically change field source when either of the   buttons are pressed.

To **show arrows**, select the corresponding surface or volume from the pipeline browser, then go to “filter → alphabetical → glyph”, select “arrow”, and press . This may not assign the right coloring to the arrows, so click the “Display” tab, and within that tab, color by efield or bfield. Be careful, because it is possible to mix e and b fields in a single visualization, which can be very confusing when misunderstood or not intended. The   will not change the data source for the arrows; this must be done by hand.

To selectively **show/hide surfaces by id**, select “external surface” in the pipeline browser, then go to “filter → alphabetical → extract block”, and check/uncheck the blocks listed. Some blocks may be unused. Our convention is usually to have surface 6 as the external metal surface. Remember to press  each time a new combination of blocks is checked and a display update is desired.

To add a **slice (cutplane)**, select “entire volume” in the pipeline browser, then press  (not to be confused with ). Specify the normal for the plane. For a plane cutting perpendicular to the Z axis, use a normal of (0, 0, 1), and press . To **assign color to this slice (or any object in the pipeline browser)**, select it in the pipeline browser if not already selected. Then use the the pulldown menu to the left of the SLAC Toolbar to select “efield”, “bfield”, or “Solid Color”. Remember to hide other surfaces which may occlude the new surface (i.e., the new slice may be hidden inside the displayed mesh surface).

To **toggle the display of particles** (if they have been loaded), press the  button. To show particle trails, select the particles in the pipeline browser, then go to “filter → alphabetical → particle pathlines”. This will add “Pathlines” and “Particles” to the pipeline browser. The “particle ID channel” should be set to “global or local IDs”. Press . The particles and trails can be colored independently by selecting them in the pipeline browser, and then specifying an exact color, or momentum, or emission type.