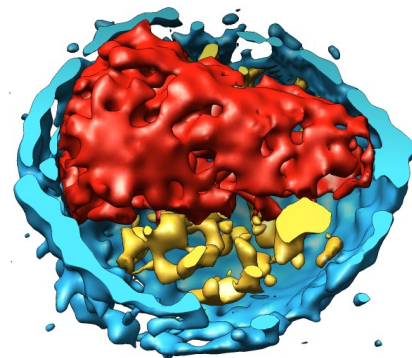


# Chimera Tutorial: Visualizing Electron Tomography

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This tutorial covers basic techniques for viewing, filtering, and segmenting noisy electron tomography maps using [Chimera 1.7](#).

We will look at a map of HIV virus particles from the Fuller lab, EM Databank [1155](#).

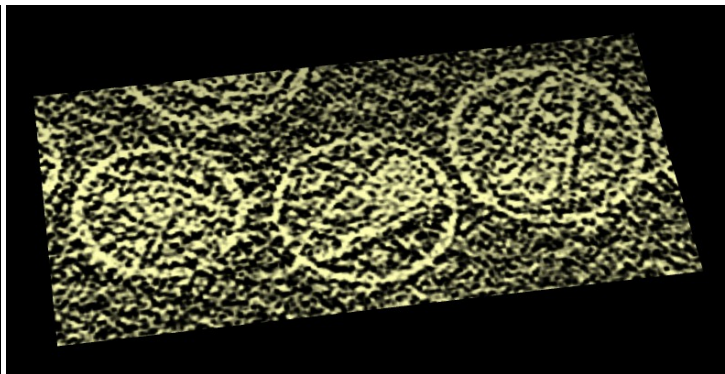


## Displaying XY Planes



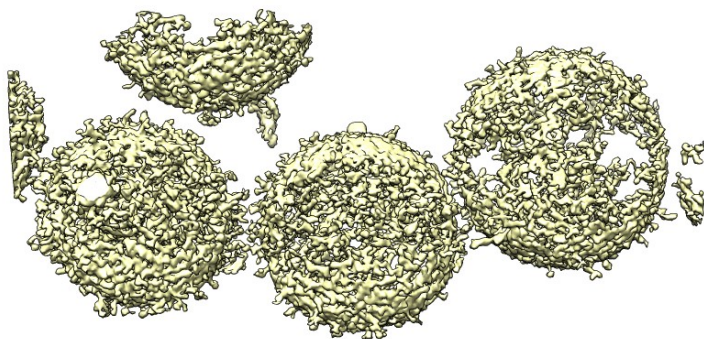
1. Open map emd\_1155.map.
2. Volume dialog, Features / Planes, press One button.
3. Drag markers on histogram brightness yellow curve.
4. Move Plane slider to flip through planes.
5. Change plane axis to z and flip through planes.
6. Show all planes.

## Inverting Intensity Values



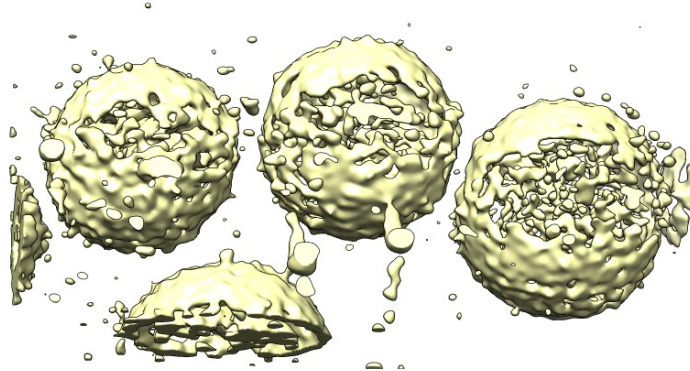
7. Note small map values are high density. Want large map values for high density.
8. Volume dialog, Tools / Volume Filter, type Scale, scale -1, options turn off displayed subregion only, press Filter.
9. Hide original map by clicking "eye" icon above histogram.
10. Switch from surface style to solid, One plane.

## Hide Dust



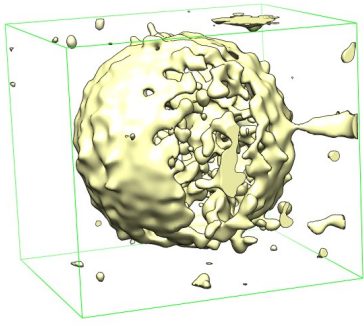
11. Hide small surface blobs to reduce noise.
12. Volume style surface, All planes.
13. Volume dialog, Tools / Hide Dust, Surface emd\_1155.map scaled, press Hide.
14. Drag vertical bar on volume dialog histogram to lower contour level.
15. Move size slider in hide dust dialog.
16. Press Unhide.

## Gaussian Filtering



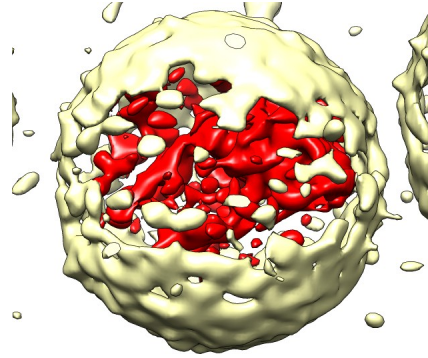
17. Smooth map to reveal large-scale features.
18. Volume dialog, Tools / Volume Filter, type Gaussian, width 30 Angstroms, value type float32, select scaled map in volume dialog, press Filter.
19. Planes One, depth 10, move plane slider.

### Extract One Virus



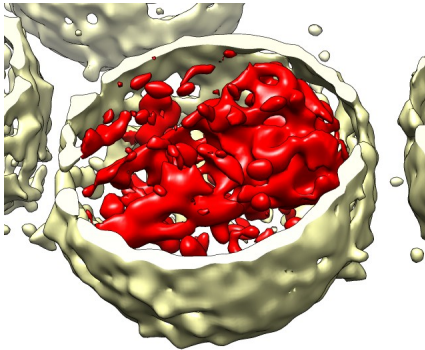
20. Volume dialog, Features / Subregion Selection, enable "Select subregions", drag box around middle virus particle, press Crop.
21. Click on green outline box face (not edge) and drag. Press Crop.
22. Uncheck "Select subregions" to move map using mouse.
23. Can save map to new file with volume dialog, File / Save Map As....

### Mask Virus Membrane



24. Show command line using Favorites / Command Line
25. Enter command "shape sphere radius 550".
26. Click off "Active" sphere model #3 below command-line to stop mouse from moving sphere.
27. Move map to be centered on sphere. Ctrl-middle-mouse moves in z direction.
28. Mesh display style can help see sphere inside map.
29. Create map for inside of sphere, command "mask #2 #3"
30. Hide sphere, Favorites / Model Panel, uncheck shown button for sphere.
31. Create map outside sphere, command "mask #2 #3 invert true".
32. Color inside map red, command "volume #4 color red".

### Clip Virus Membrane



33. Cut virus membrane in half to see inside.
34. Tools / Depiction / Per-Model Clipping, Model #5, check "Enable clipping".
35. Check "Adjust clipping with mouse", move clip plane by dragging with middle mouse button in graphics window.