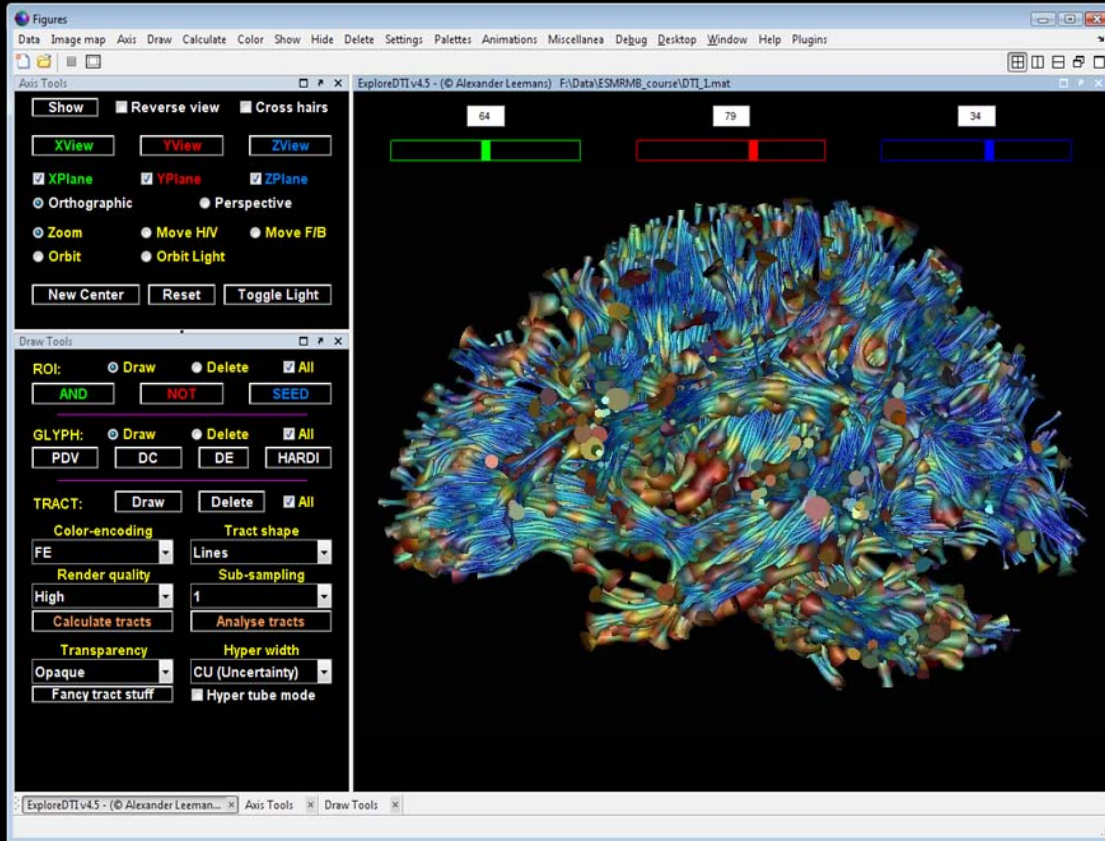


Exploring DTI with "ExploreDTI"



Alexander Leemans

(see ISMRM 2009 abstract # 3537)



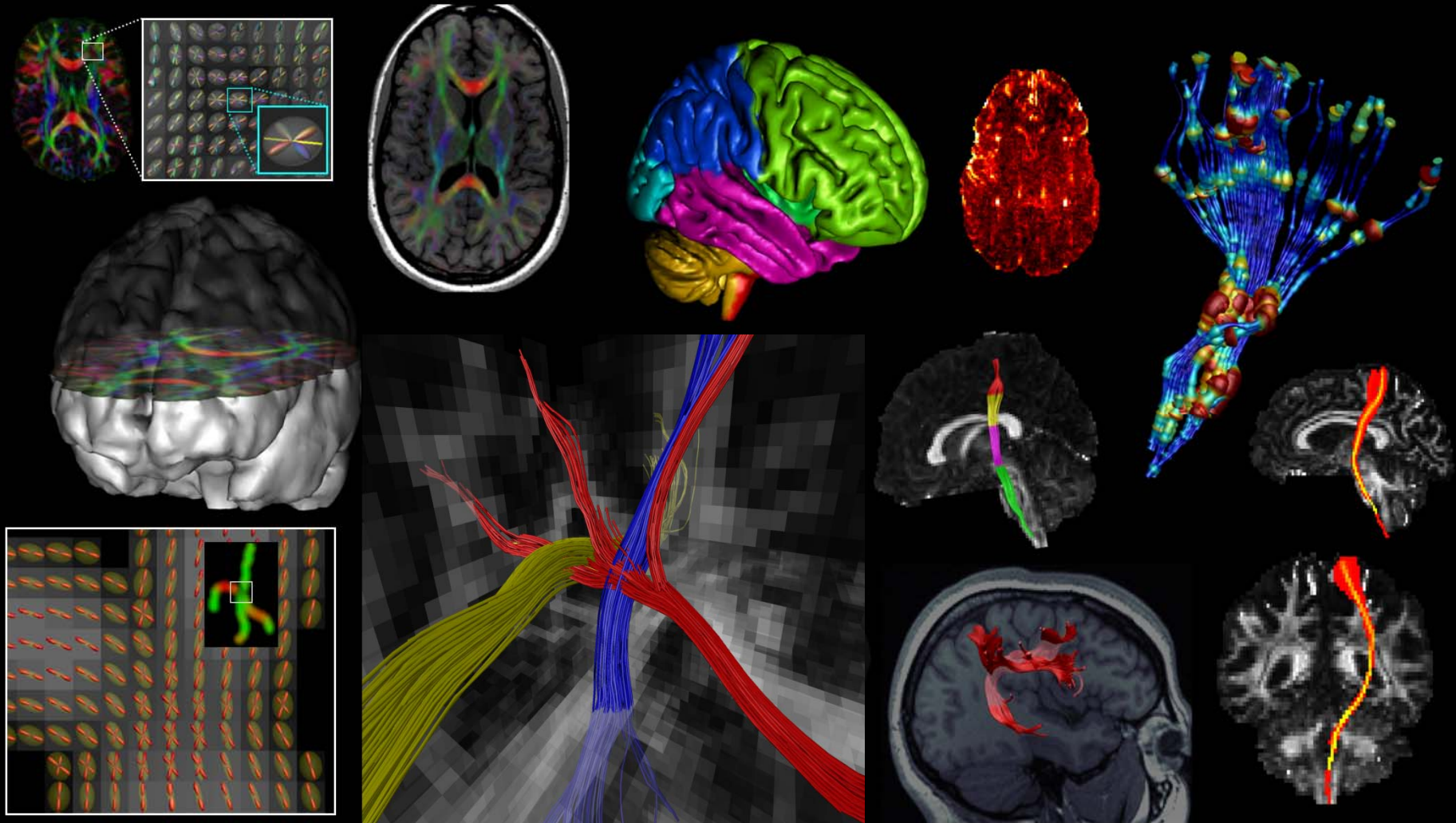
Image Sciences Institute



University Medical Center
Utrecht

(<http://www.ExploreDTI.com>)

"ExploreDTI": overview of processing, visualizing & analyzing diffusion (tensor) MRI data



ExploreDTI ... just one of many!

The Freiburg Package

Camino

FSL – TBSS – Prob Track

ExploreDTI

FreeSurfer

TrackVis

ITK Plugin

BIRN tools

Slicer3

DtiStudio

NFG

MRtrix

GTract

MIPAV

MRI Studio

BRAINS

Biolume Suite

...



Getting your diffusion data into ExploreDTI

ExploreDTI's data converter to create DTI *.mat files

Format diffusion weighted data	4D Nifti (*.nii)
Permute spatial dimensions	AP RL IS
Flip spatial orientations	AP RL IS
Perform visual data check	No
Diffusion tensor estimation	Linear (high speed - low accu...
Format diffusion information	Text file (*.txt)
Background masking approach	Automatic
Permute gradient components	x y z
Flip sign of gradient components	x y z
Data processing mode	Single data set
b-value in units s/mm ²	1300
Voxel size [AP RL IS] (in mm)	2.3984 2.3984 2.4
Number of non-DW images	6
Number of DW images	32
Matrix size [AP RL IS]	128 128 60

Start converting to DTI *.mat file(s) ...

Scanner data (*.dcm, *.img/hdr, *.par/rec, *.nii, ...)



Converter tool

*.mat files (Matlab), but Matlab is **NOT** required!

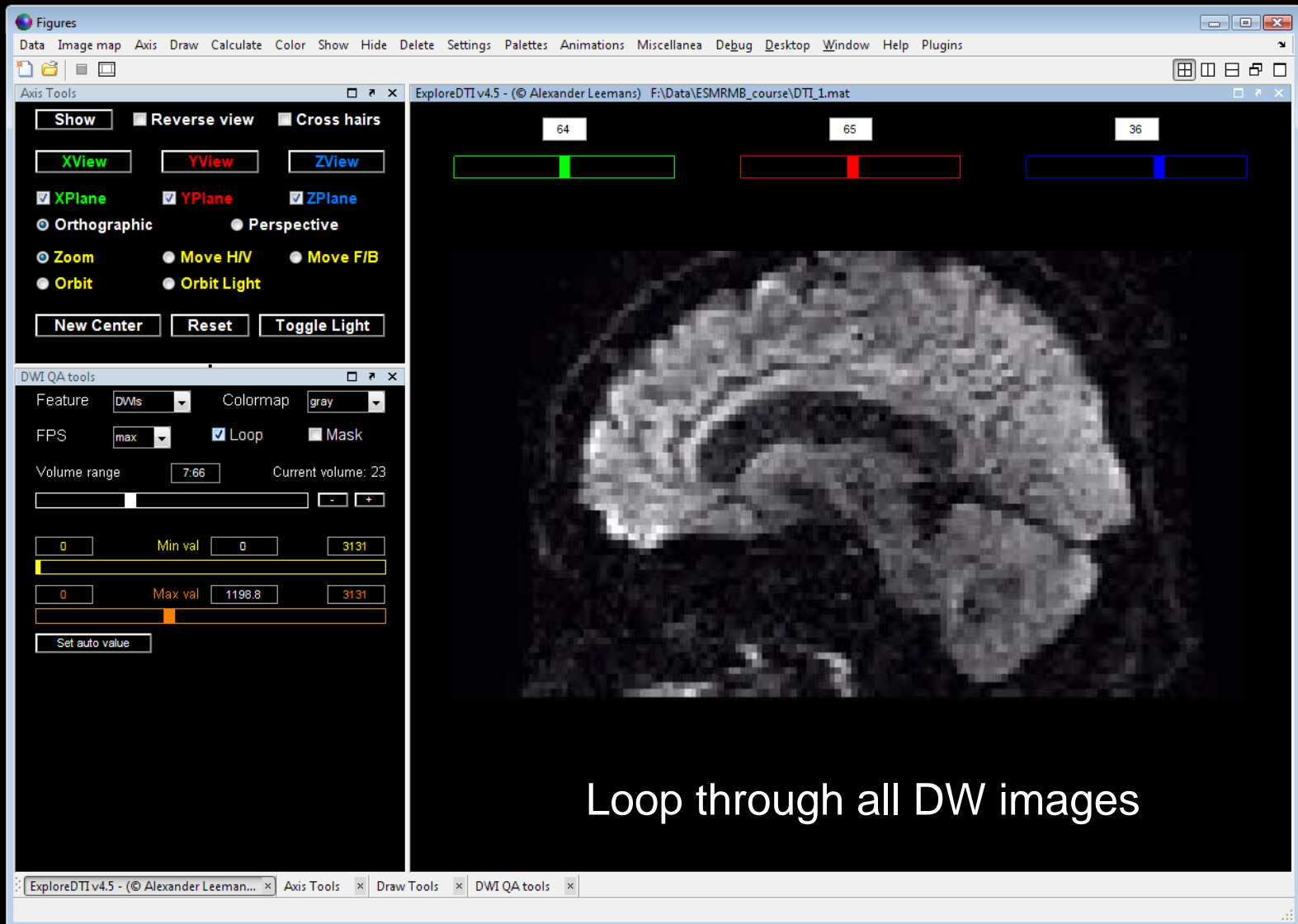


ExploreDTI

(<http://www.ExploreDTI.com>)



Data quality assessment tools



Data quality assessment tools

The screenshot displays the ExploreDTI v4.5 software interface. The main window shows a brain scan with three color-coded regions: 64 (green), 65 (red), and 36 (blue). The interface includes several toolbars and panels:

- Axis Tools:** Contains buttons for 'Show', 'Reverse view', 'Cross hairs', 'XView', 'YView', 'ZView', 'XPlane', 'YPlane', 'ZPlane', 'Orthographic', 'Perspective', 'Zoom', 'Move H/V', 'Move F/B', 'Orbit', 'Orbit Light', 'New Center', 'Reset', and 'Toggle Light'.
- DWI QA tools:** Includes a 'Feature' dropdown set to 'DWIs', a 'Colormap' dropdown set to 'gray', 'FPS' set to 'max', 'Loop' checked, 'Mask' unchecked, 'Volume range' set to '7 66', and 'Current volume: 7'. It also features sliders for 'Min val' (0 to 3131) and 'Max val' (0 to 1198.8), and a 'Set auto value' button.

At the bottom of the interface, a status bar shows the current volume range: **Loop through DW image 7 & 66**.



Data quality assessment tools

The screenshot displays the 'Figures' software interface. The main window shows a brain MRI slice with three color-coded regions: 64 (green), 65 (red), and 36 (blue). The 'Axis Tools' panel on the left includes options for 'Show', 'Reverse view', 'Cross hairs', 'XView', 'YView', 'ZView', 'XPlane', 'YPlane', 'ZPlane', 'Orthographic', 'Perspective', 'Zoom', 'Move H/V', 'Move F/B', 'Orbit', 'Orbit Light', 'New Center', 'Reset', and 'Toggle Light'. The 'DWI QA tools' panel includes 'Feature' (DWIs), 'Colormap' (gray), 'FPS' (max), 'Loop', 'Mask', 'Volume range' (7-66), 'Current volume: 66', and two sliders for 'Min val' (0-3131) and 'Max val' (0-1198.8). A 'Set auto value' button is also present. The text 'Loop through all corrected DW images' is overlaid at the bottom of the main window.

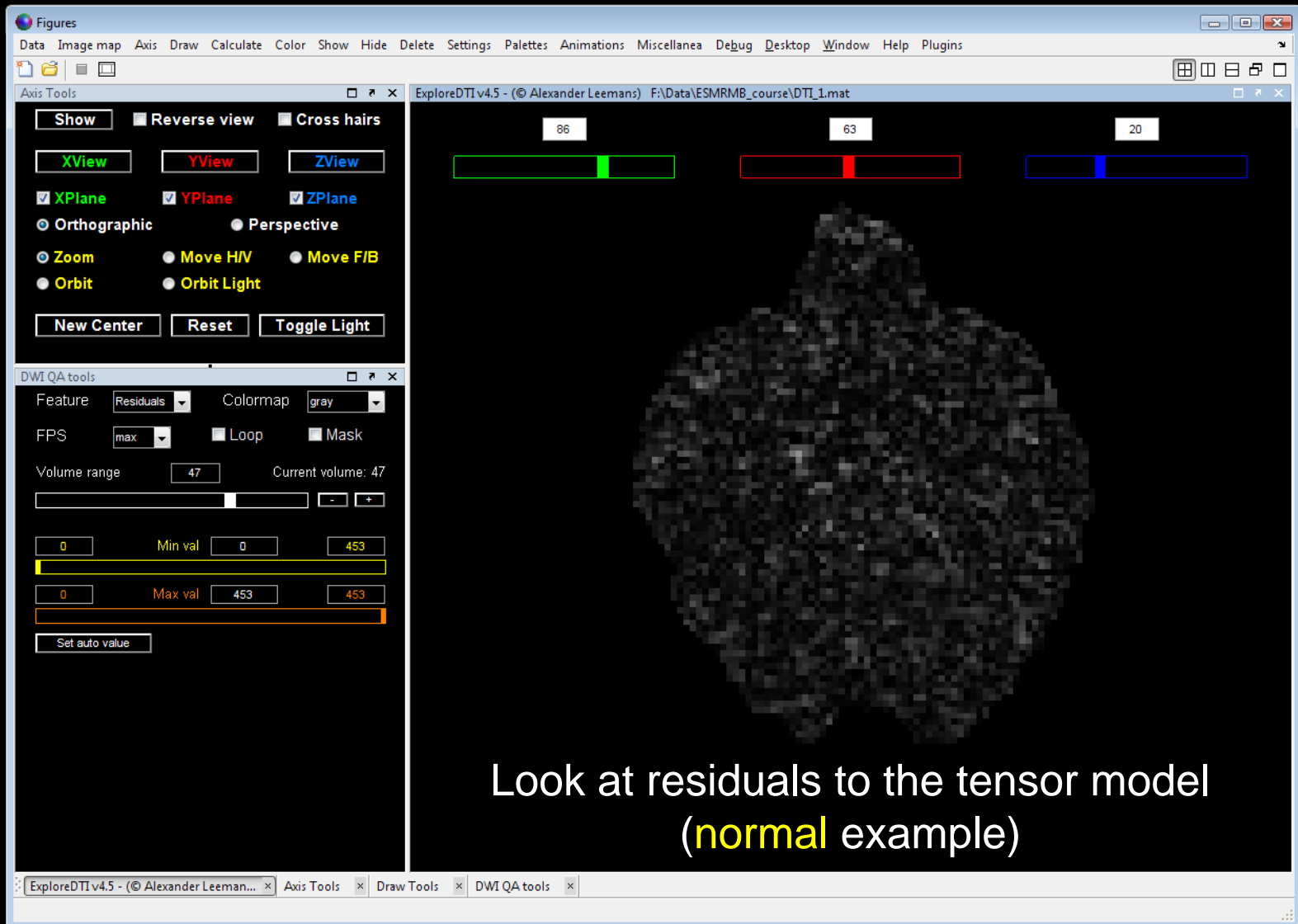
Data quality assessment tools

The screenshot displays the ExploreDTI v4.5 software interface. The main window shows a brain MRI slice with three color-coded markers (64, 65, 36) and corresponding horizontal bars above it. The interface includes several toolbars and panels:

- Axis Tools:** Contains buttons for 'Show', 'Reverse view', 'Cross hairs', 'XView', 'YView', 'ZView', 'XPlane', 'YPlane', 'ZPlane', 'Orthographic', 'Perspective', 'Zoom', 'Move H/V', 'Move F/B', 'Orbit', 'Orbit Light', 'New Center', 'Reset', and 'Toggle Light'.
- DWI QA tools:** Includes dropdowns for 'Feature' (DWIs) and 'Colormap' (gray), 'FPS' (max), 'Loop', 'Mask', 'Volume range' (7-66), 'Current volume: 66', and sliders for 'Min val' (0-3131) and 'Max val' (0-1198.8). A 'Set auto value' button is also present.

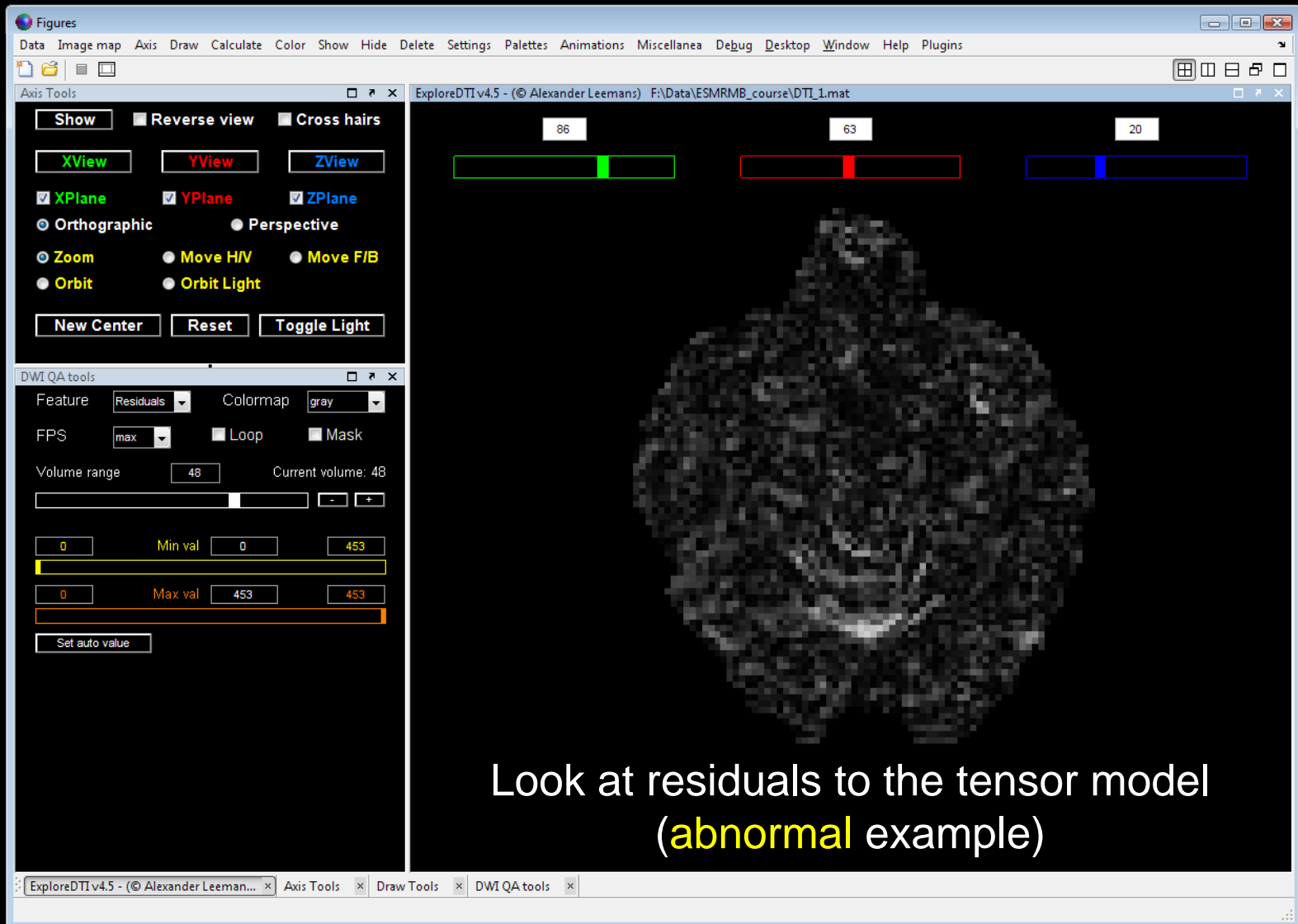
At the bottom of the window, a text overlay reads: "Loop through **corrected** DW image 7 & 66".

Data quality assessment tools

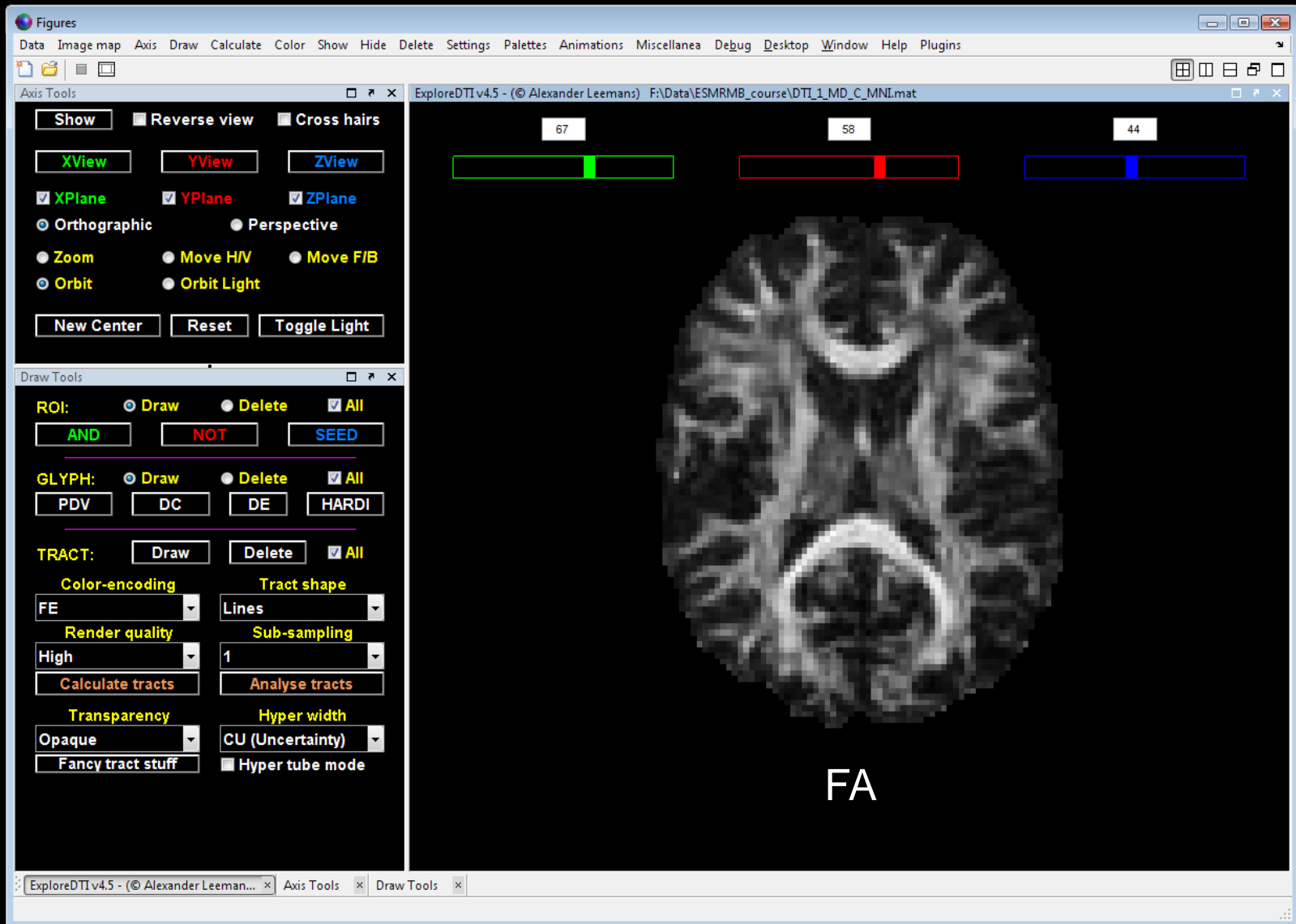


Look at residuals to the tensor model
(normal example)

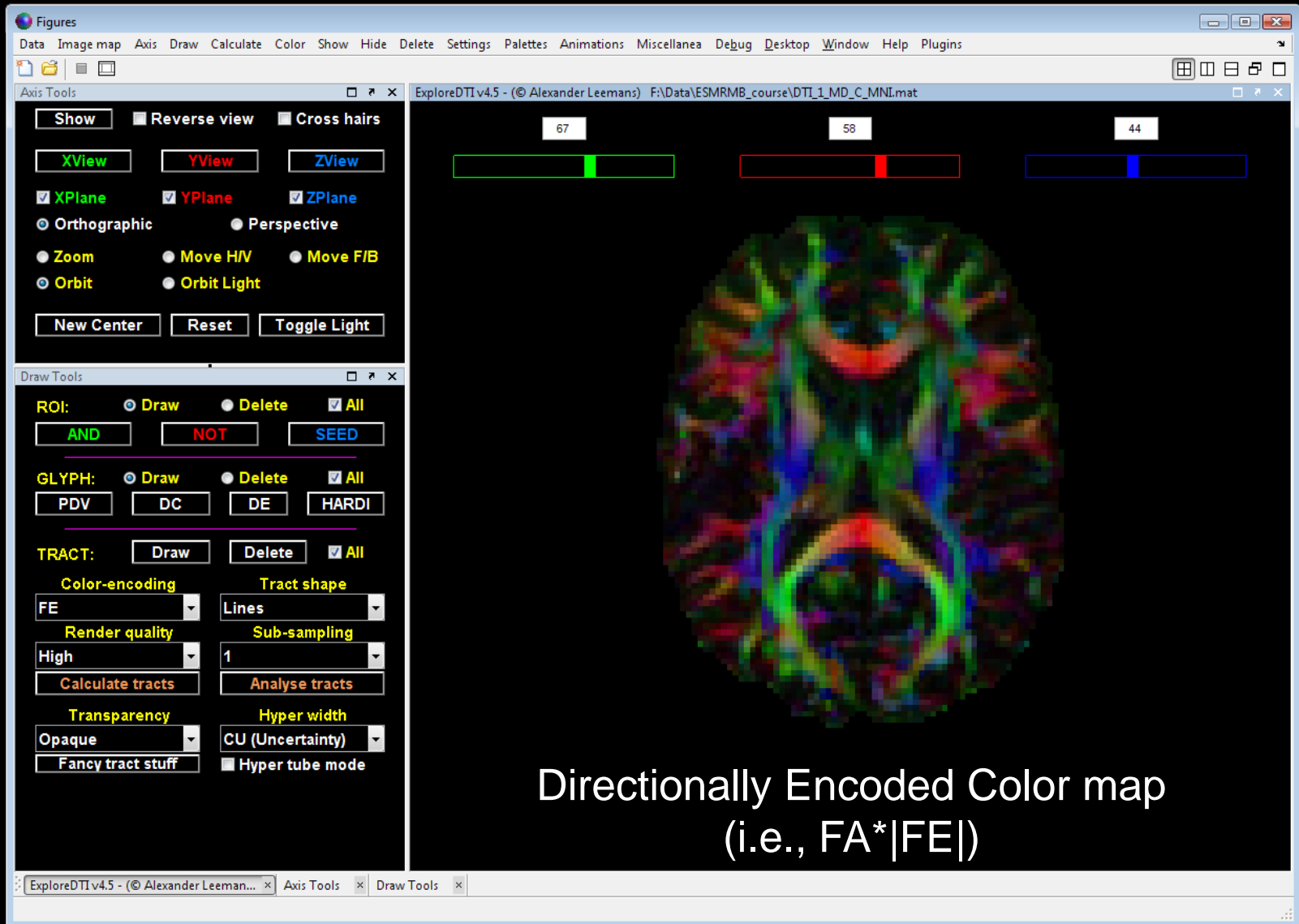
Data quality assessment tools



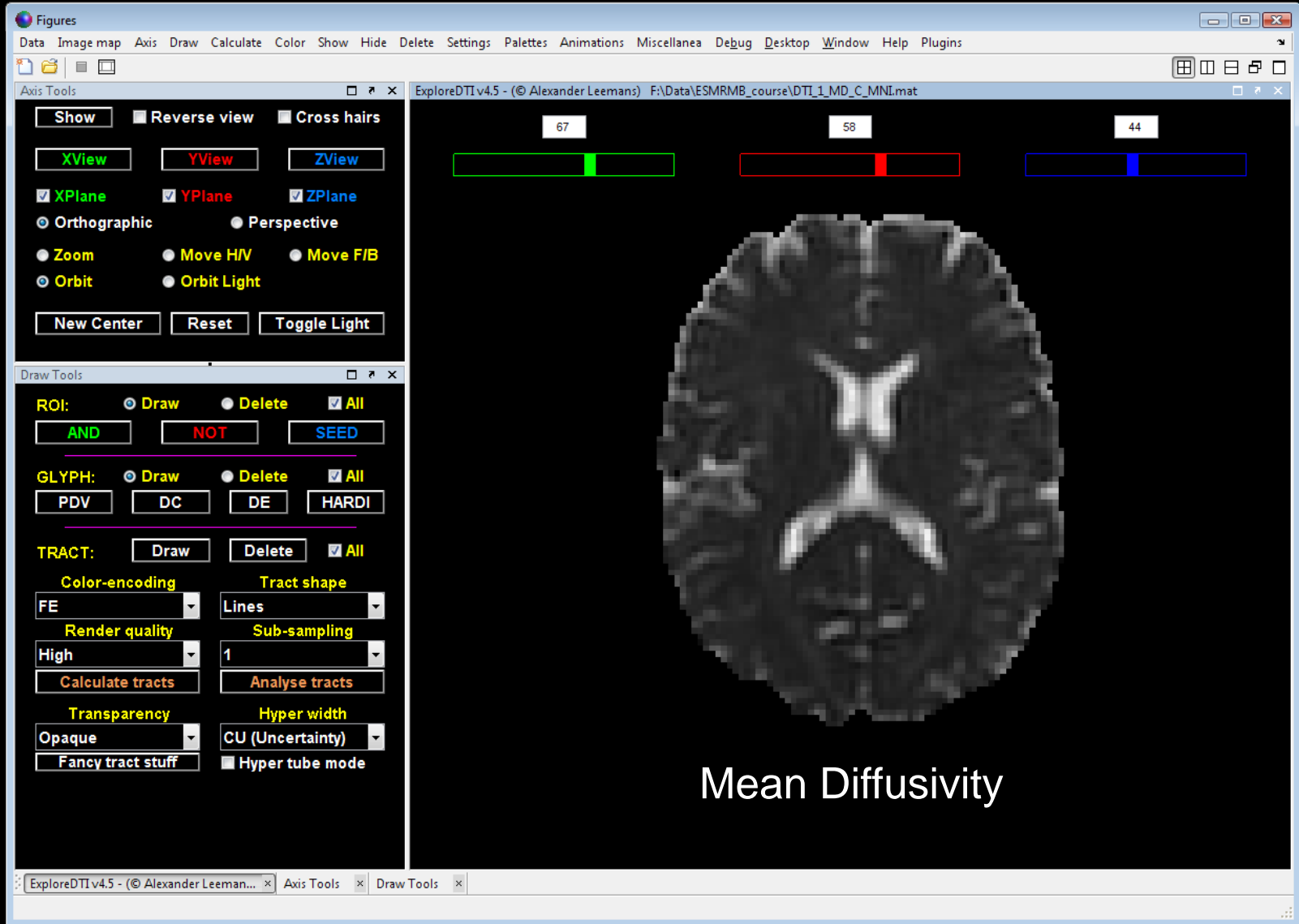
Visualization



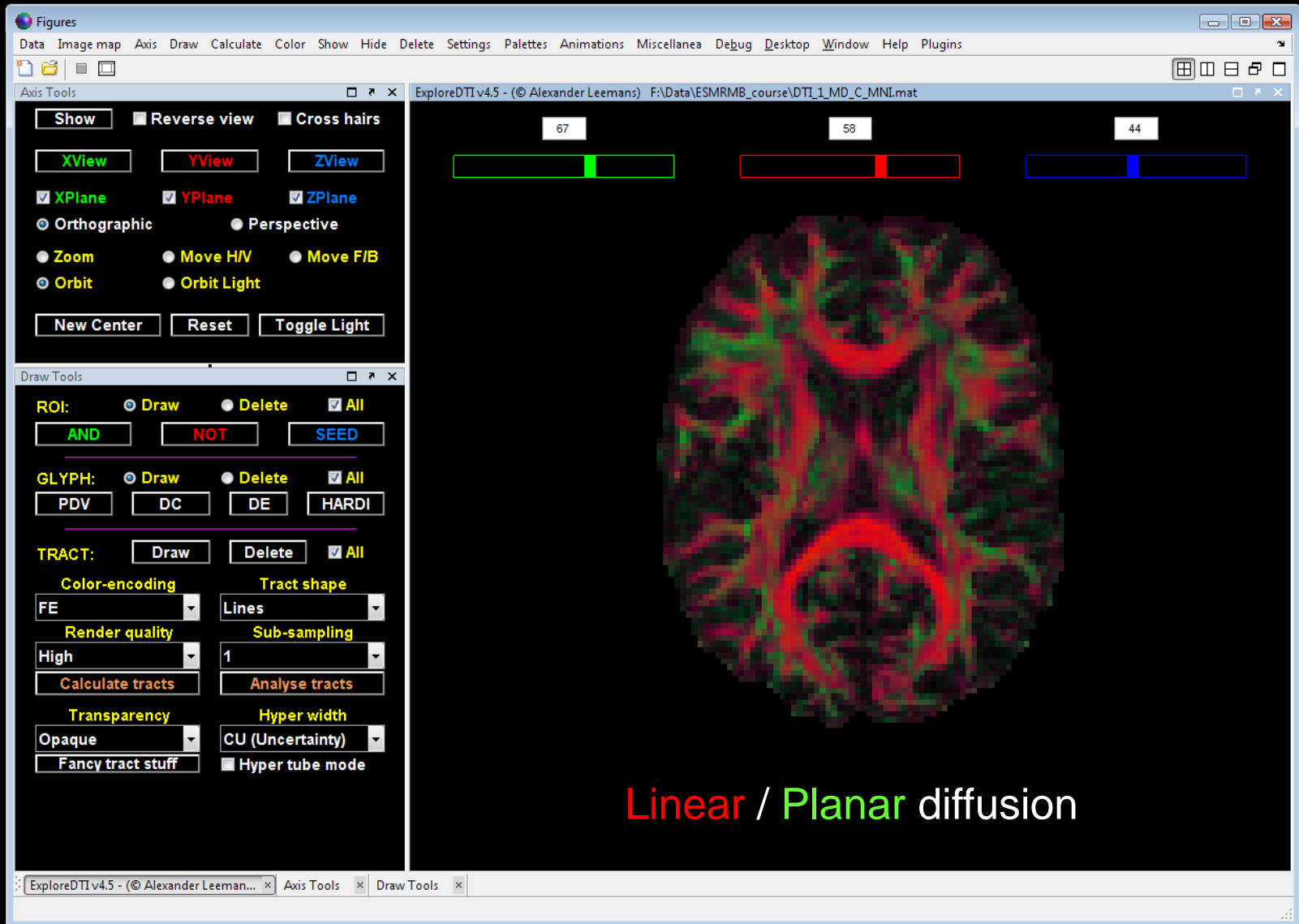
Visualization



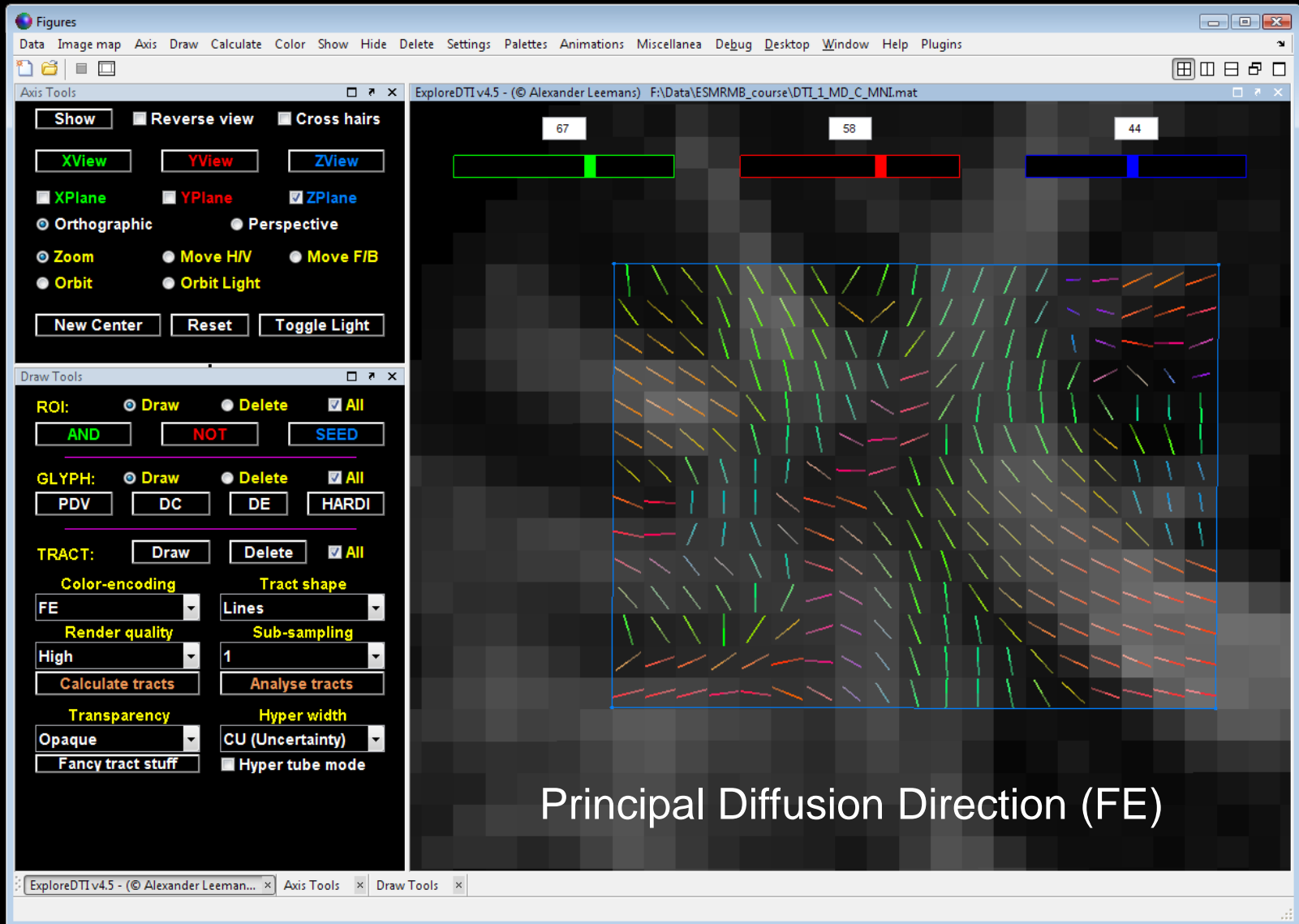
Visualization



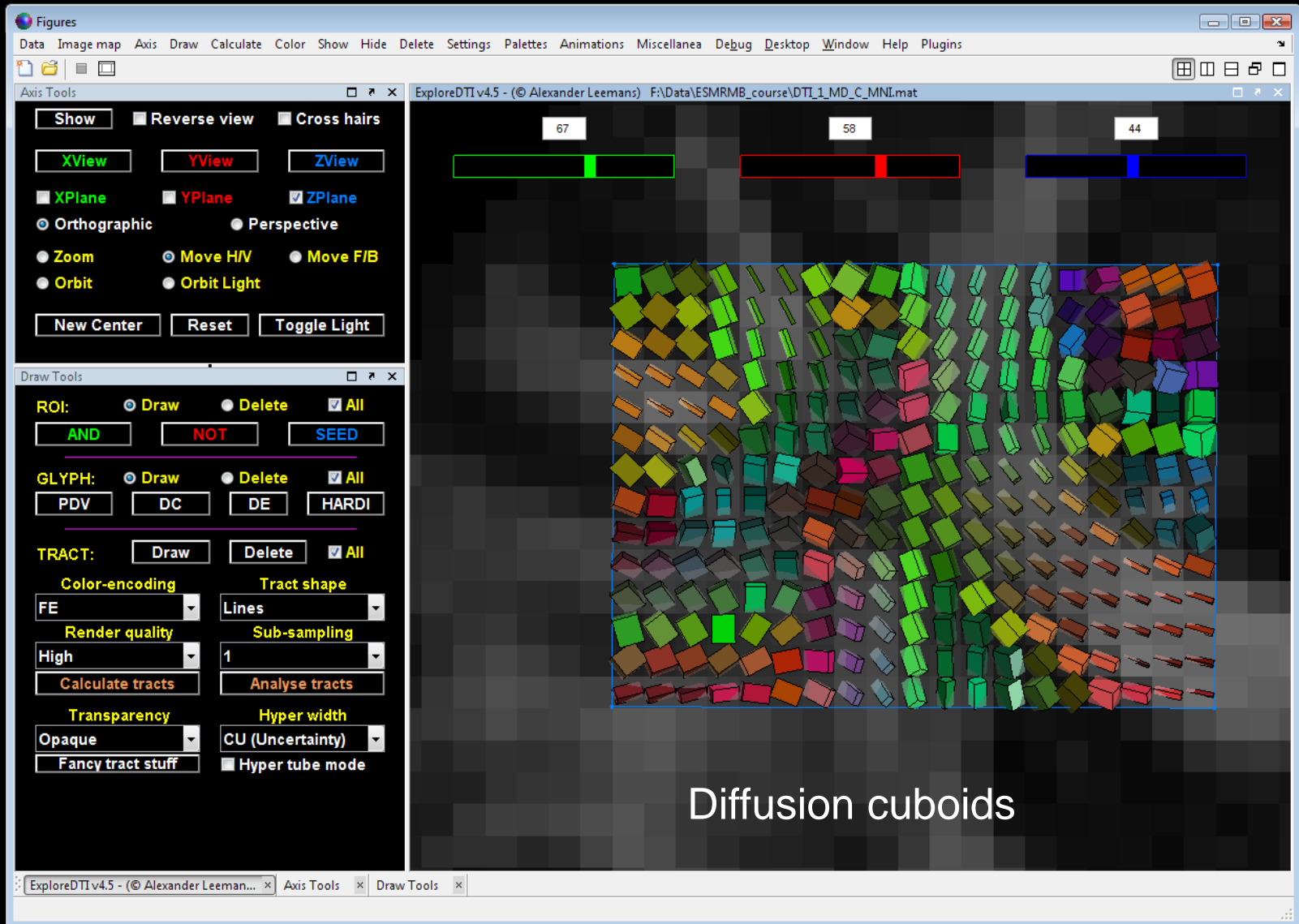
Visualization



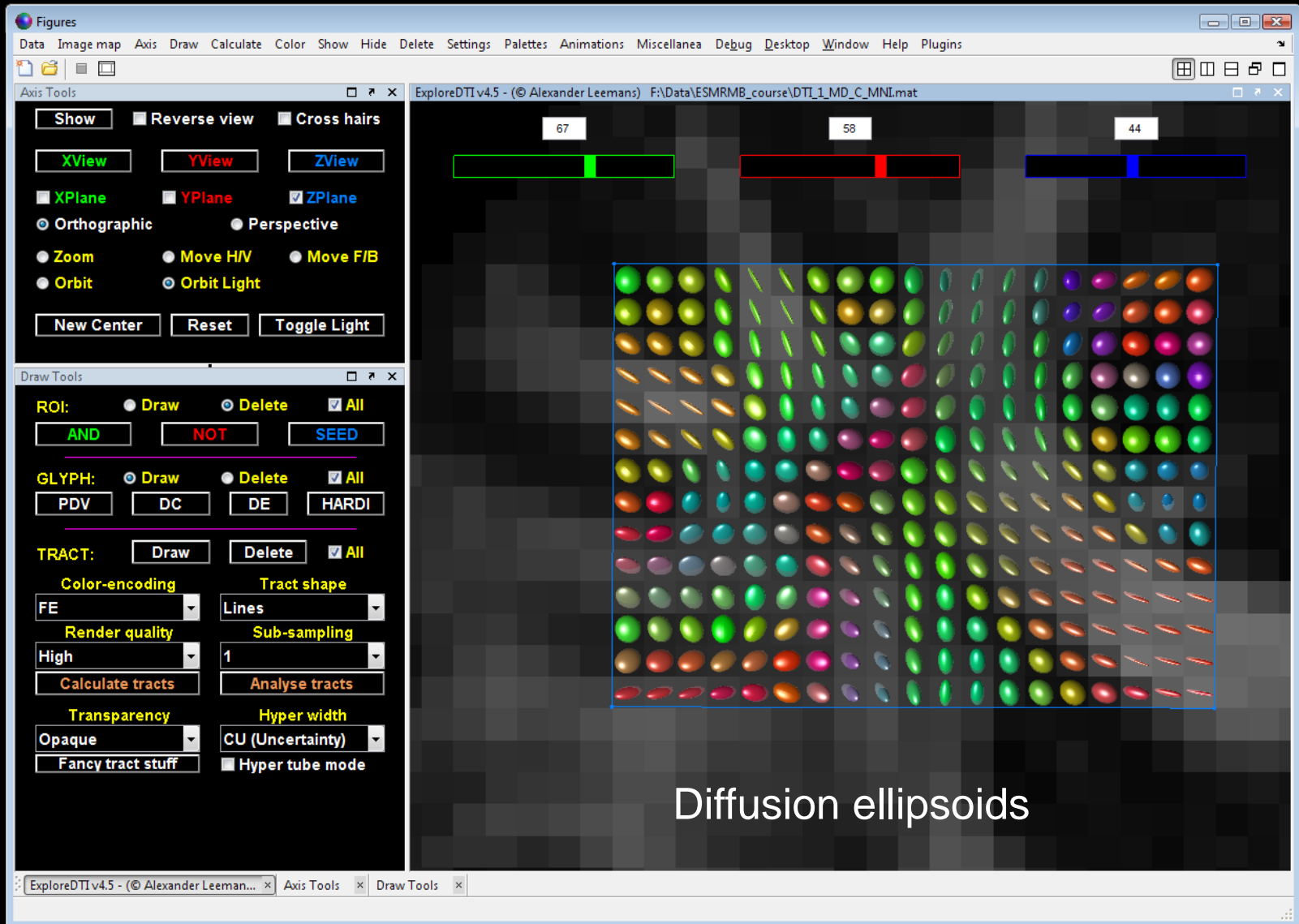
Visualization



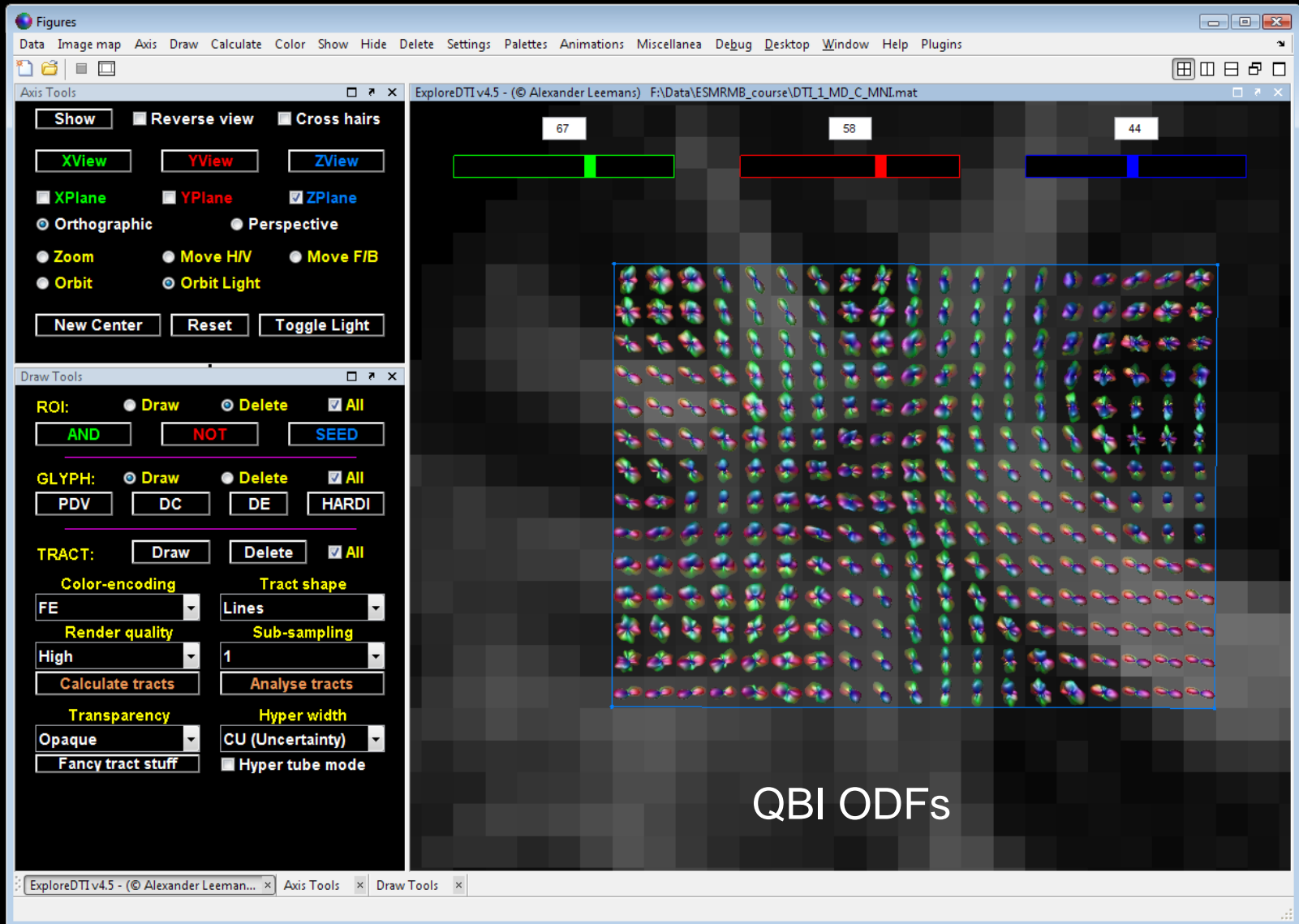
Visualization



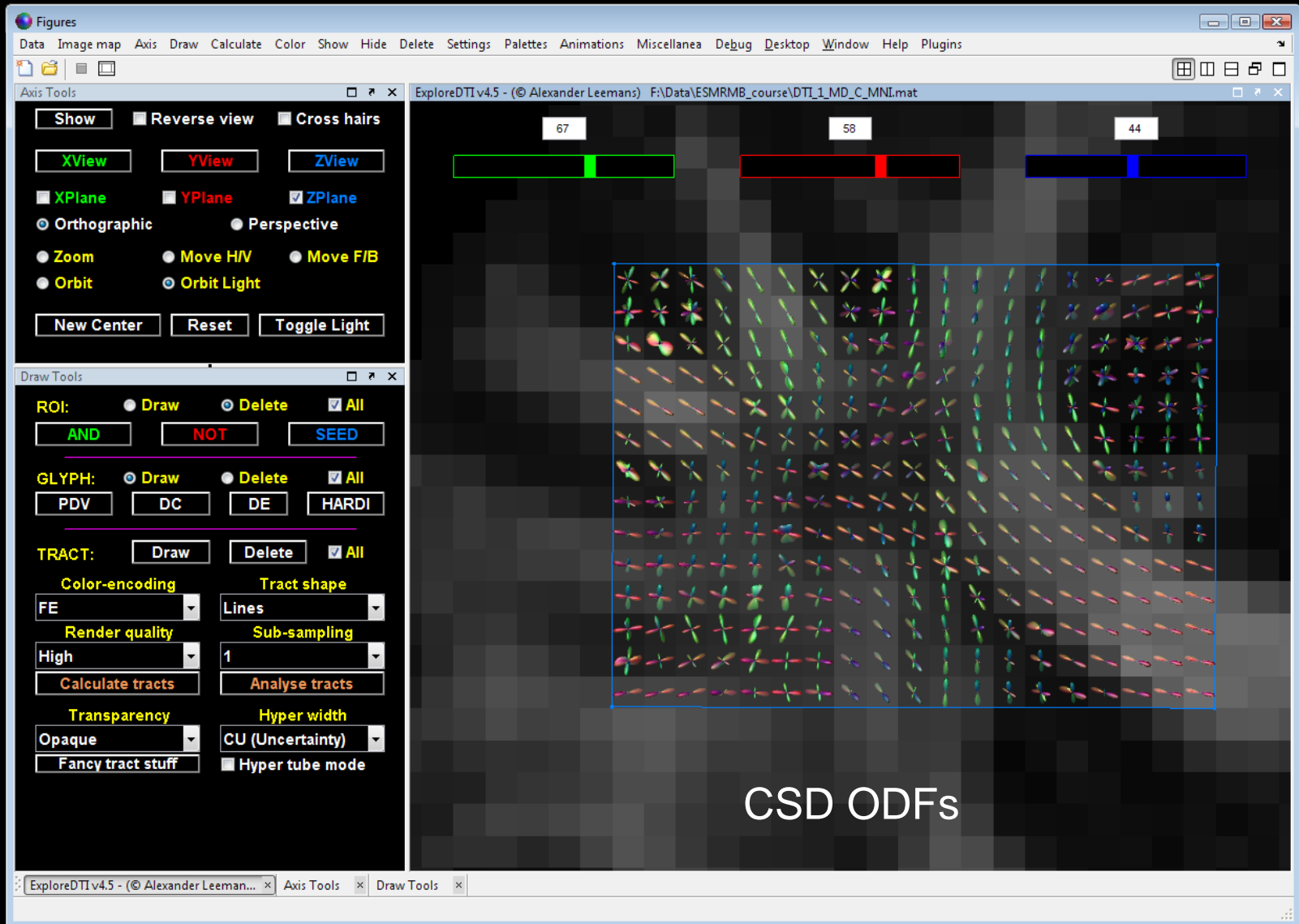
Visualization



Visualization



Visualization



Visualization

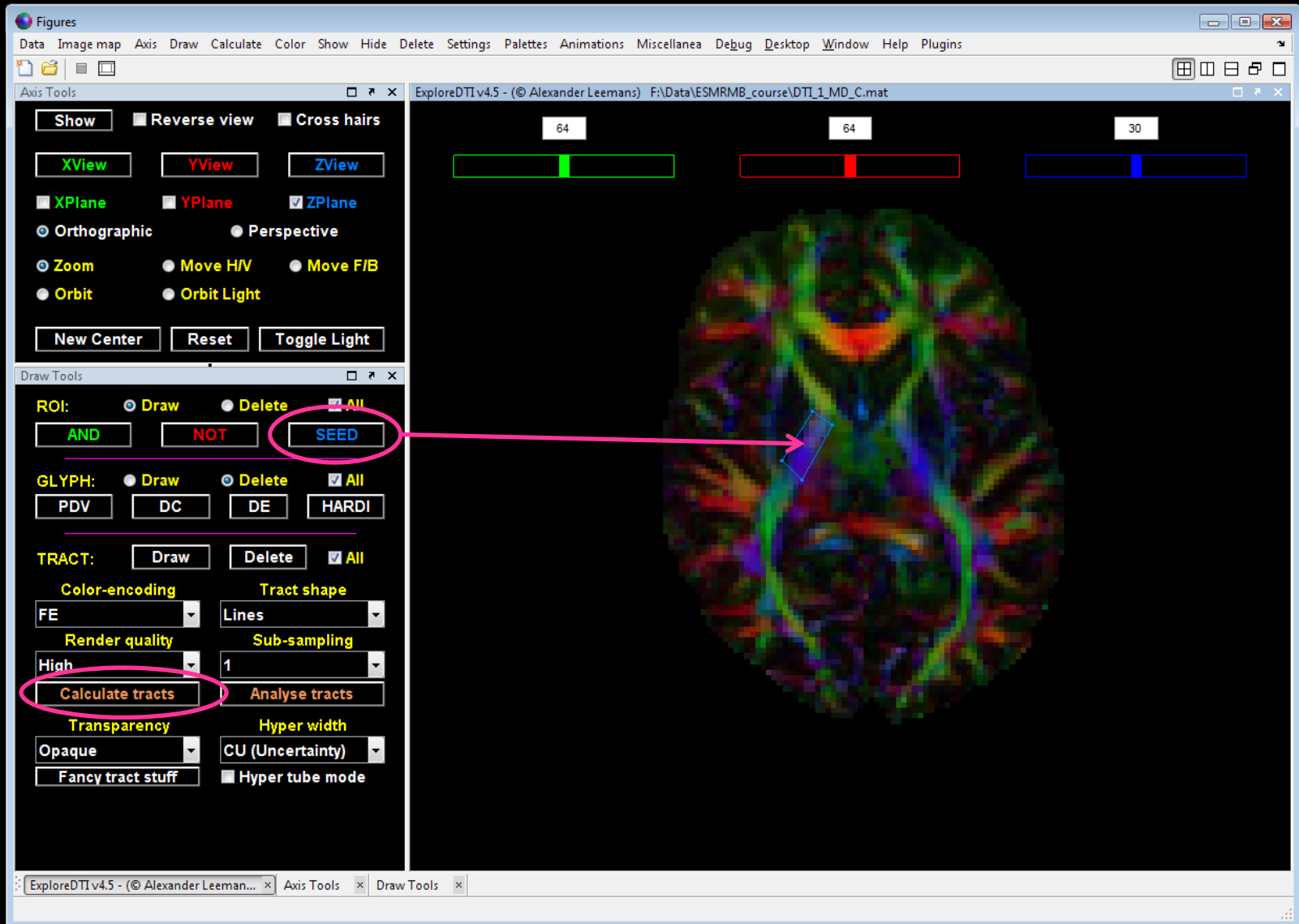
The screenshot displays the ExploreDTI v4.5 software interface. The main window shows a 4x4 grid of glyphs, each representing a different fiber orientation. Above the grid, three horizontal bars are visible, labeled with the number 64, indicating the number of glyphs in each row. The interface includes several control panels:

- Axis Tools:** Contains buttons for 'Show', 'Reverse view', and 'Cross hairs'. It also has view selection buttons for 'XView', 'YView', and 'ZView', and plane selection buttons for 'XPlane', 'YPlane', and 'ZPlane'. View modes include 'Orthographic' and 'Perspective', and navigation options like 'Zoom', 'Orbit', 'Move H/V', and 'Move F/B'. Additional buttons include 'New Center', 'Reset', and 'Toggle Light'.
- Draw Tools:** Features ROI controls ('Draw', 'Delete', 'All') and buttons for 'AND', 'NOT', and 'SEED'. It also includes GLYPH controls ('Draw', 'Delete', 'All') and buttons for 'PDV', 'DC', 'DE', and 'HARDI'. Tract controls include 'Draw', 'Delete', and 'All'. Color-encoding is set to 'FE' and Tract shape to 'Lines'. Render quality is 'High' and Sub-sampling is '1'. Buttons for 'Calculate tracts' and 'Analyse tracts' are present. Transparency is set to 'Opaque' and Hyper width is 'CU (Uncertainty)'. Other options include 'Fancy tract stuff' and 'Hyper tube mode'.

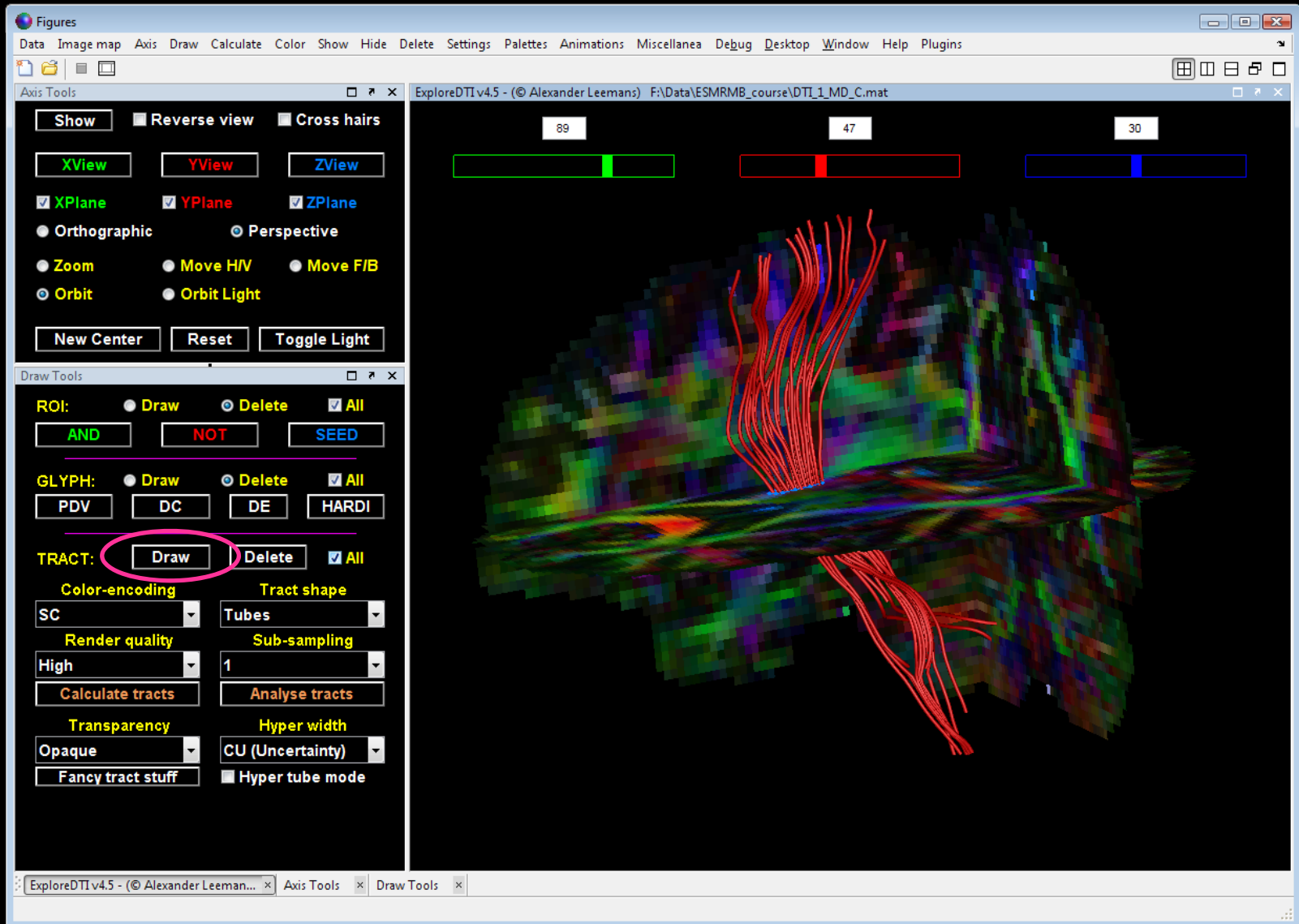
The text "Combination of glyphs" is overlaid at the bottom of the main visualization area.



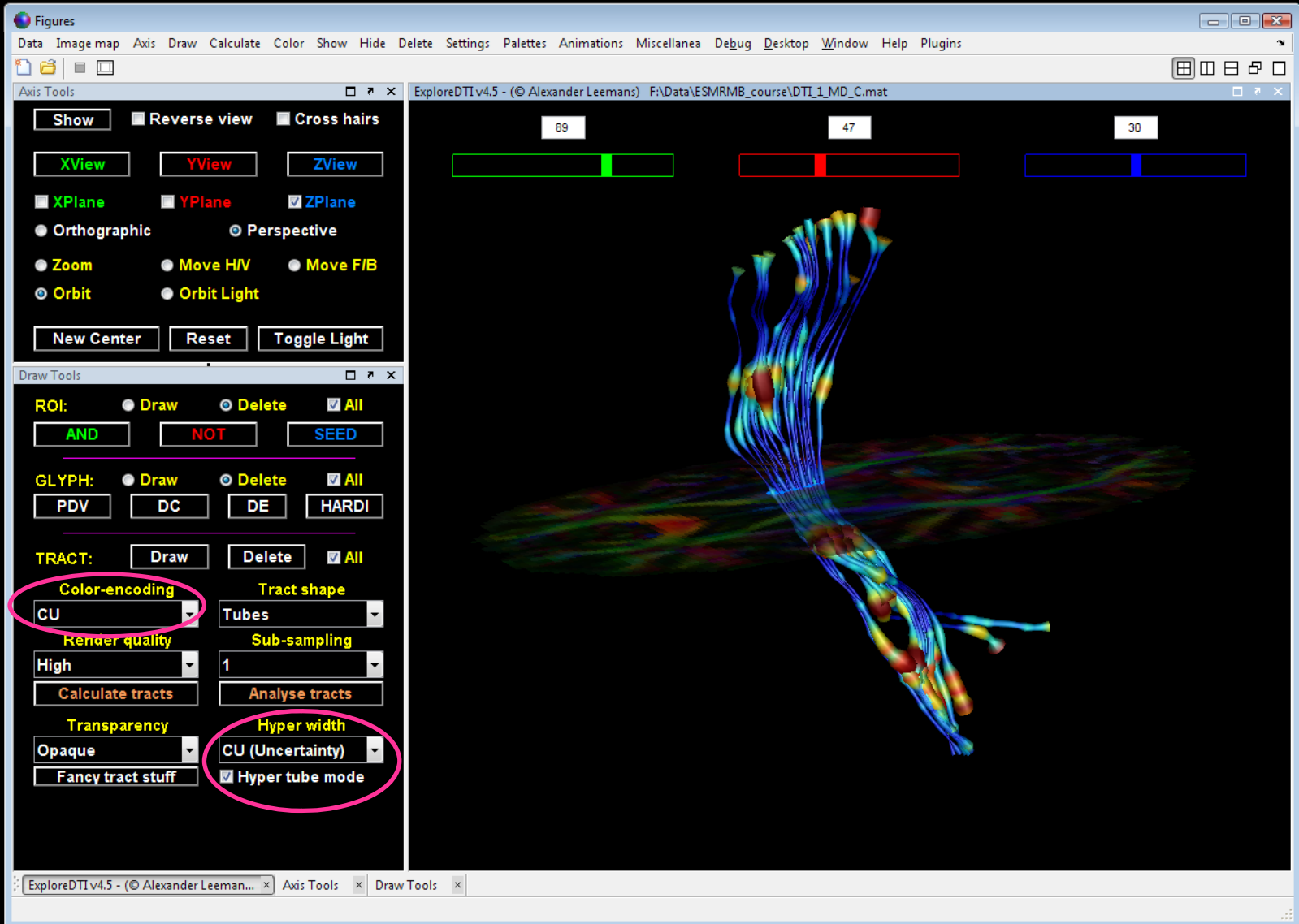
Fiber tractography



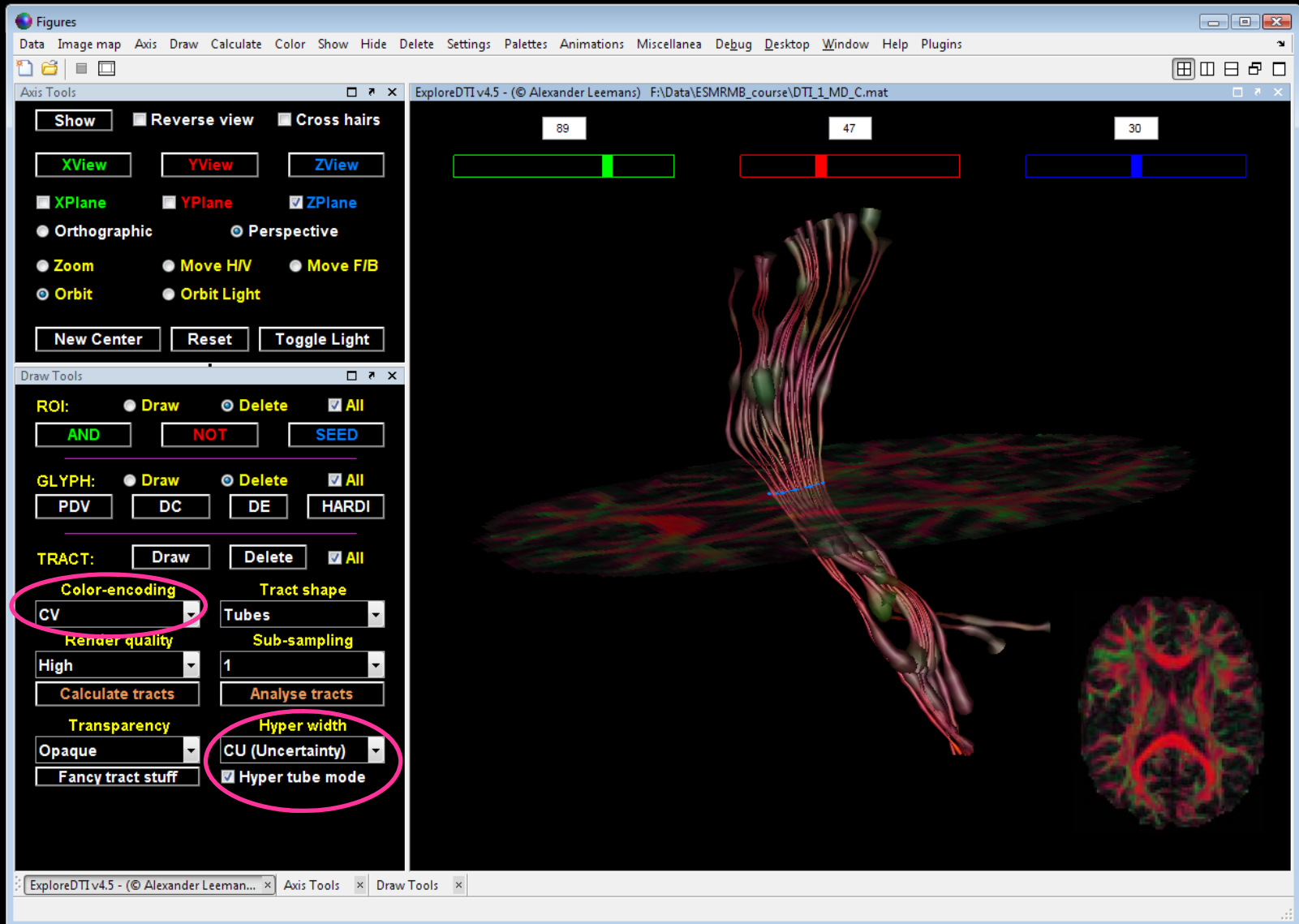
Fiber tractography



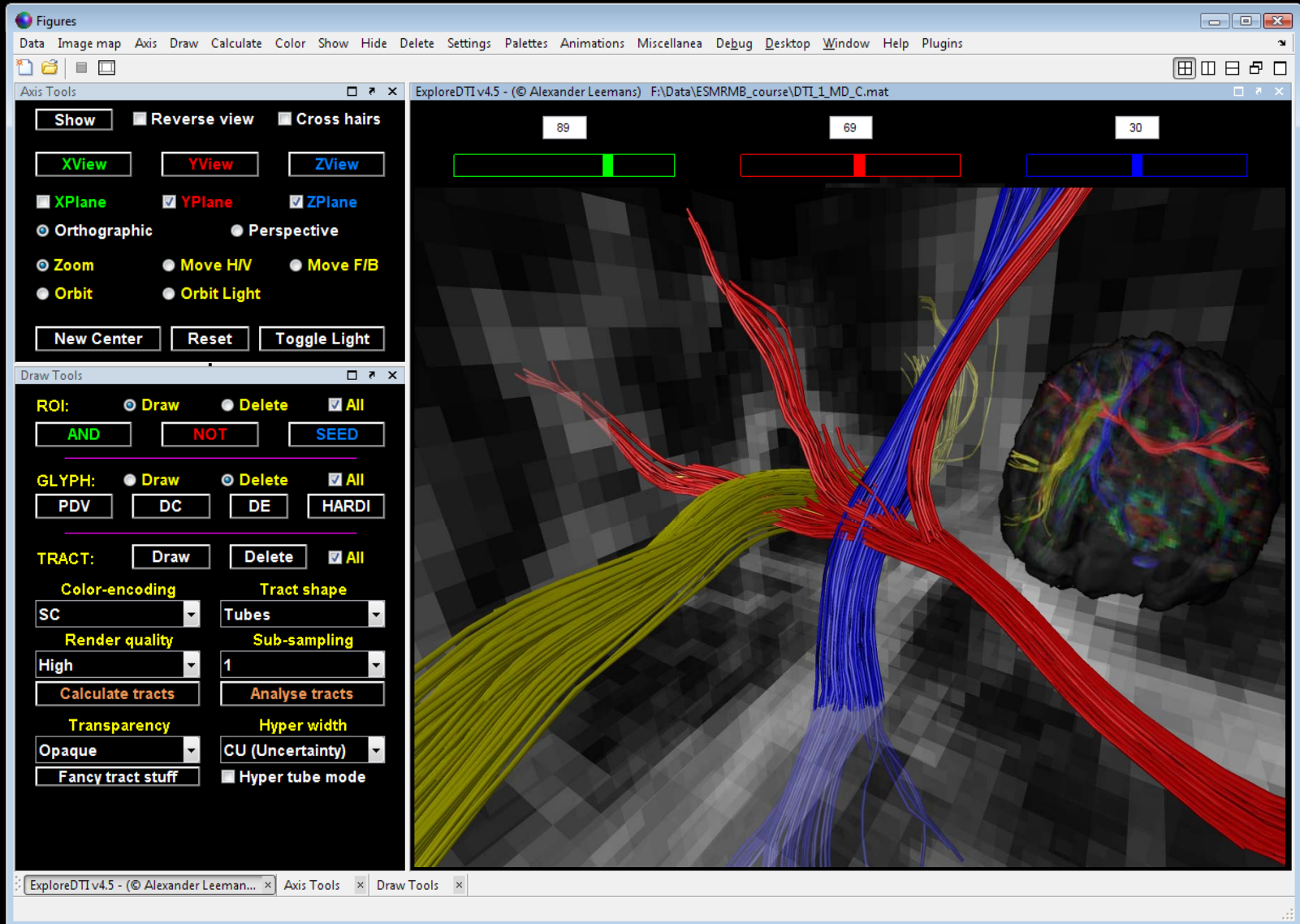
Fiber tractography (hyper streamtubes)



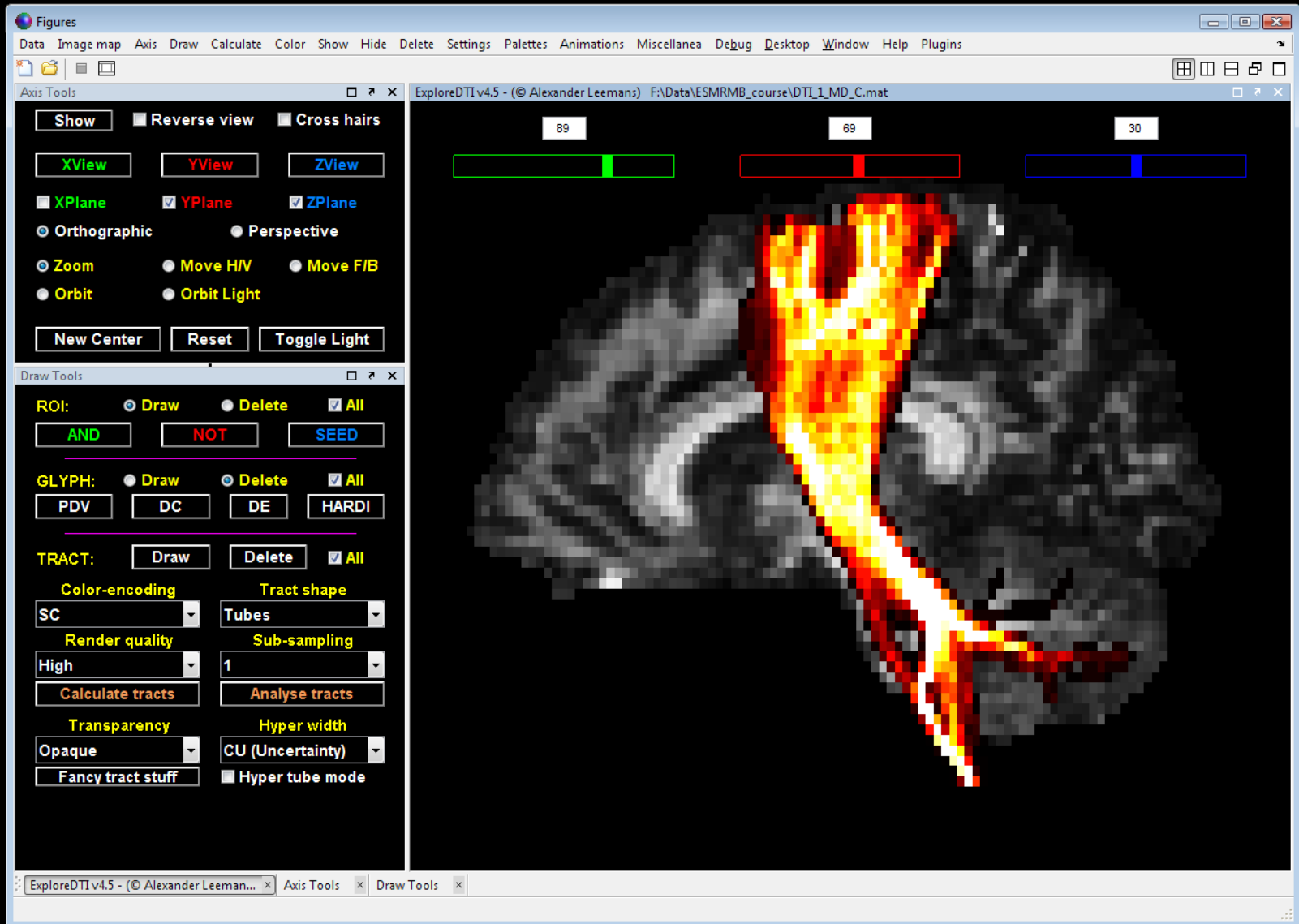
Fiber tractography



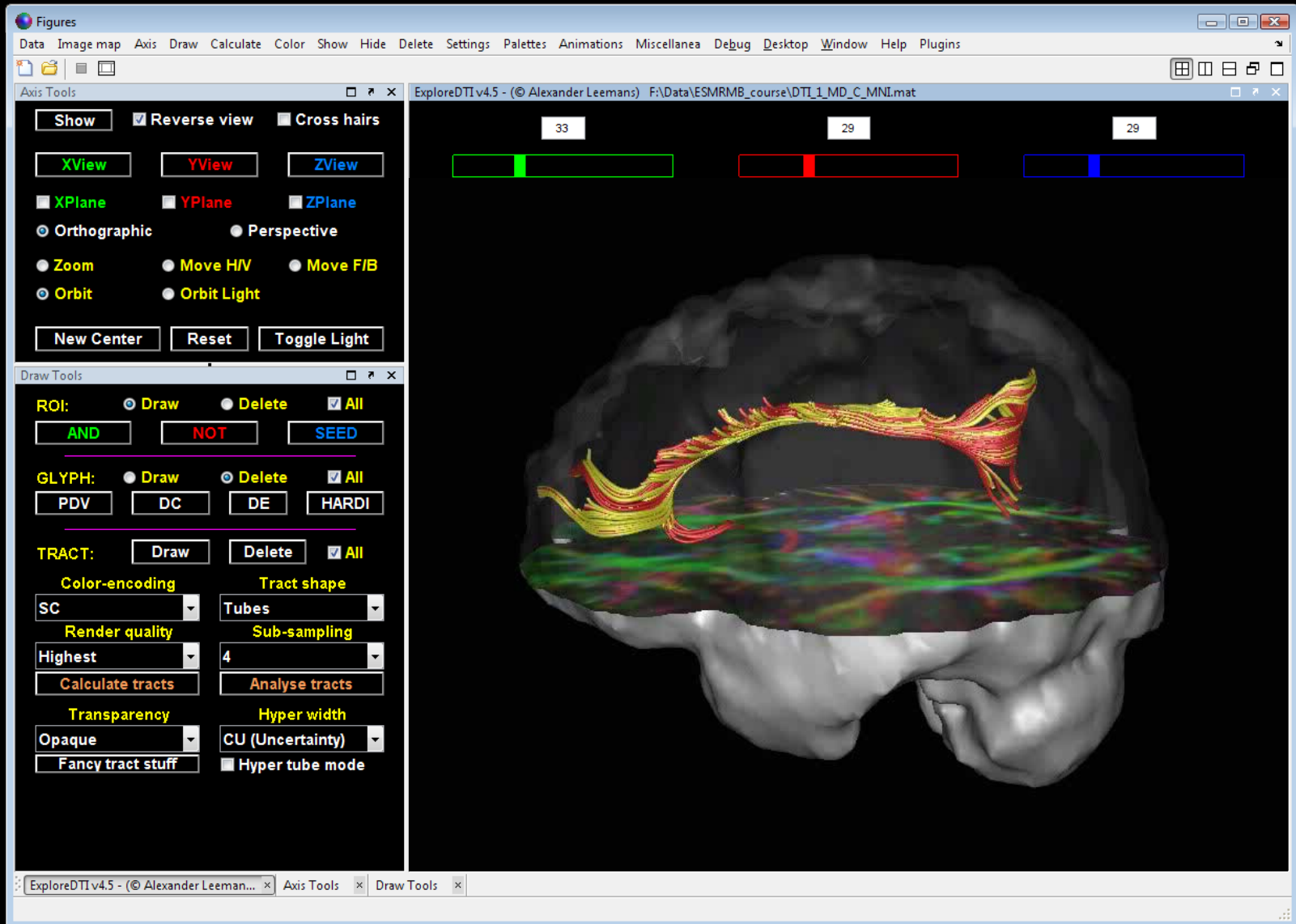
CSD Fiber tractography (crossing fibers)



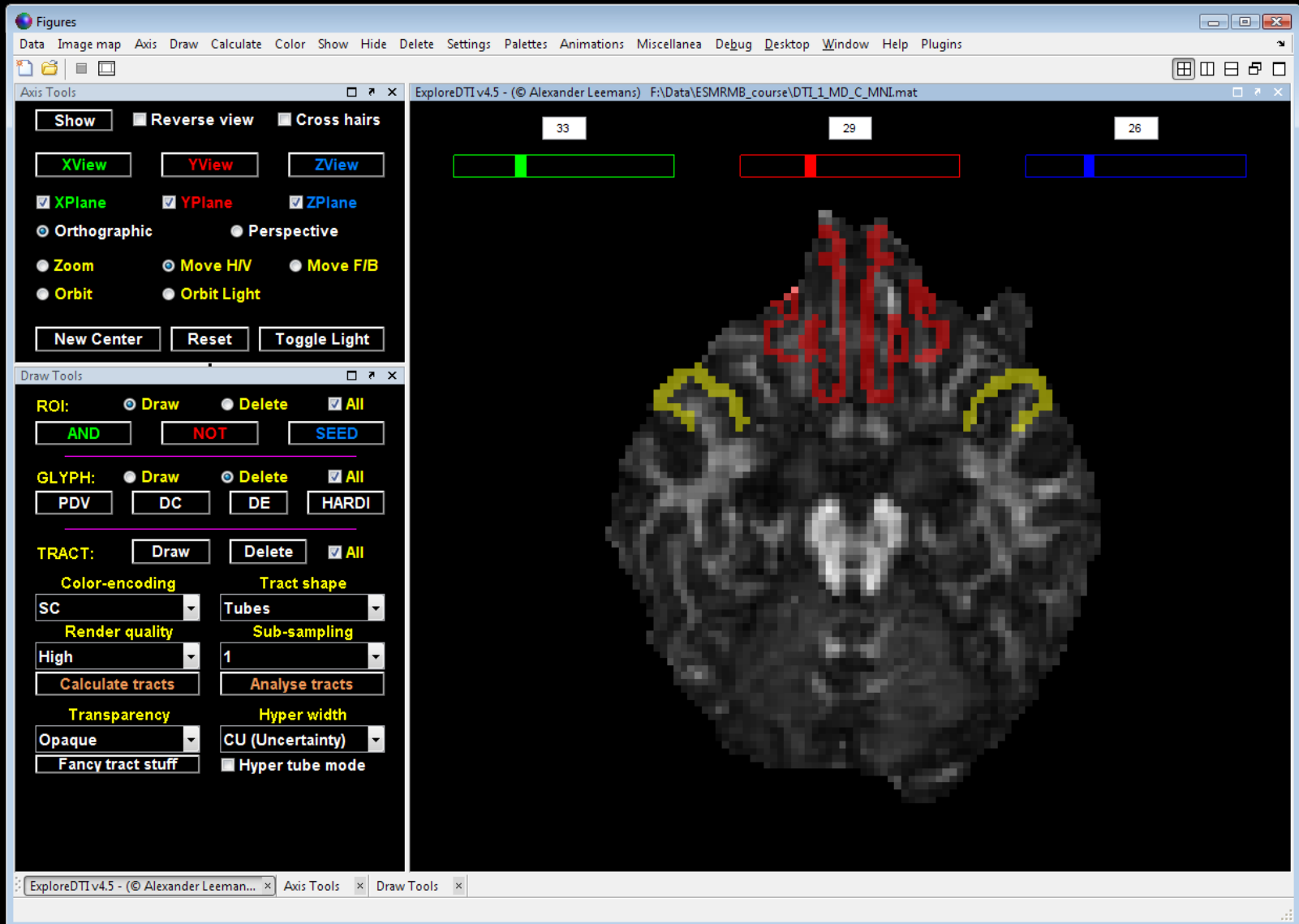
'Probabilistic' fiber tractography



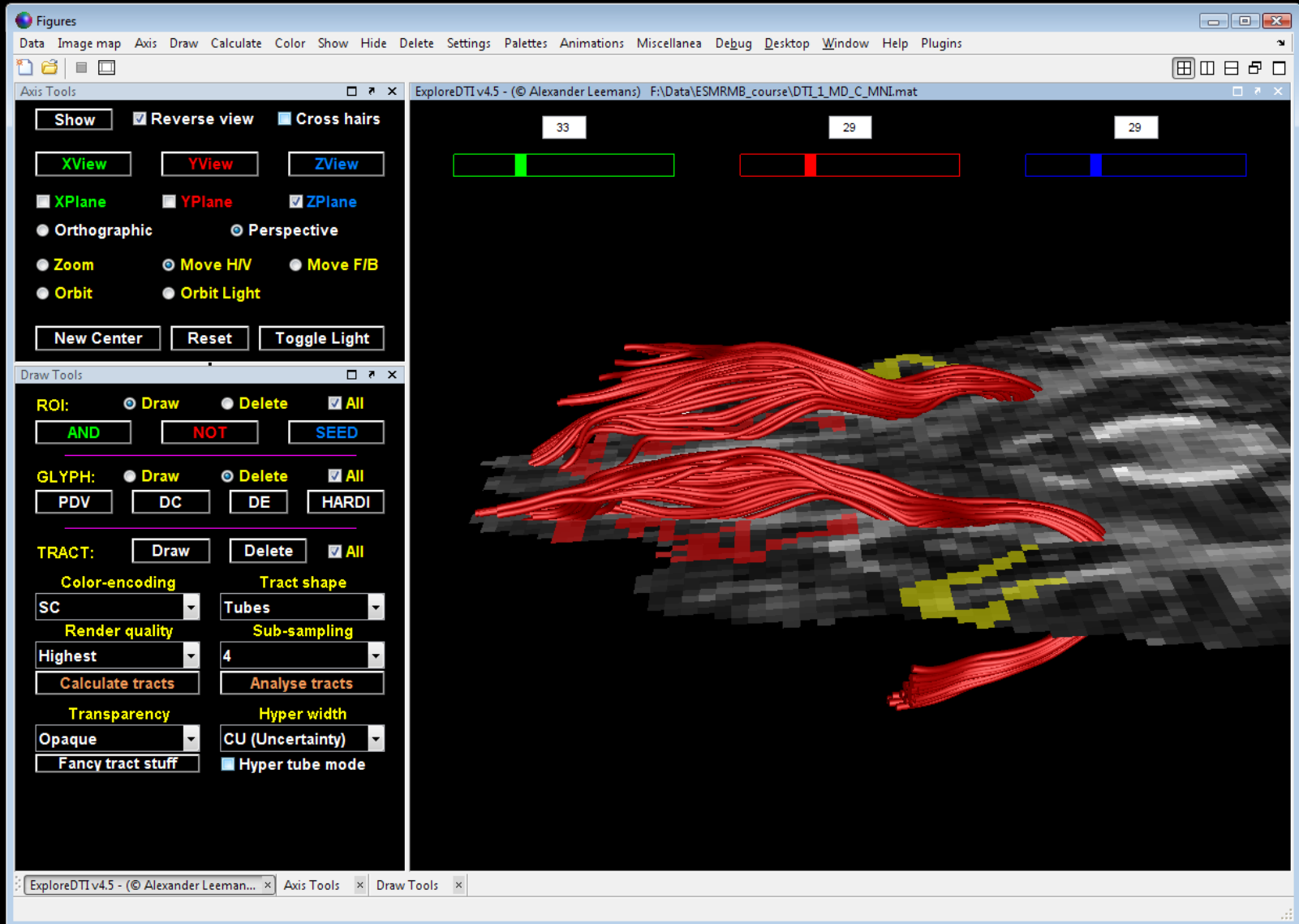
Brain surface rendering



Atlas based Fiber tractography



Atlas based Fiber tractography



And more ... ('Help' → 'Manual')

