


**Laboratory of Mathematics in Imaging**

Harvard Medical School  
Brigham and Women's Hospital

**DT-MRI Module in Slicer**

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**History DT-MRI Software at BWH**

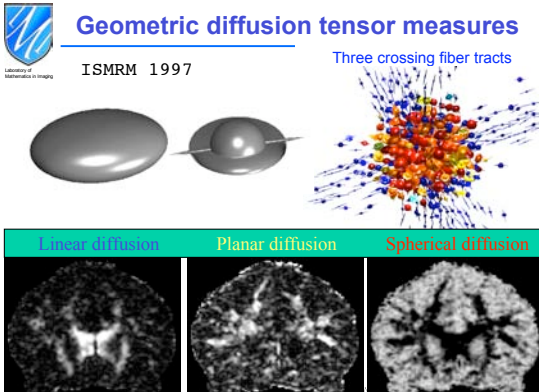
Westin	DT-MRI in Matlab	1997-
O'Donnell	DT-MRI in Slicer	2001-
Estepar	DT-MRI in Slicer	2003-
Guimond	DT-MRI Registration, vtk	2002
Park	DT-MRI Registration, vtk	2003
Caan	DT-MRI Registration, Slicer	2004
Isorna	Interface Slicer, Protocols	2004
Boucher	B-splines, Runge-Kutta 4-5, Slicer	2004
Ruiz-Alzola	DT-MRI Registration, Matlab	2000-
Brun	Stochastic Tracing, Matlab	2001-
O'Donnell	Connectivity, Matlab	2002-
Haker	Connectivity, Matlab	2002-
Brun	Fiber Grouping, Matlab	2002-
Park	DoDTI, Matlab	2003-
Westin	Tensor Normconv, Matlab	2003-
Martin	Multivariate MRF, Matlab	2003-
Friman	Connectivity, Matlab	2003-
Peled	Multicomponent, Matlab	2004-
Kindlmann	Visualization, C, teem, nrrd	2004-

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**Geometric diffusion tensor measures**

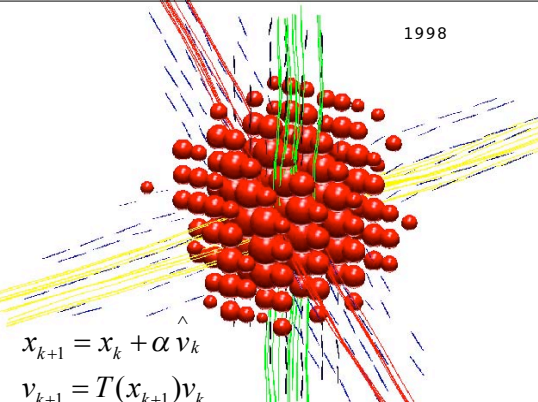
ISMRM 1997

Three crossing fiber tracts



Linear diffusion    Planar diffusion    Spherical diffusion

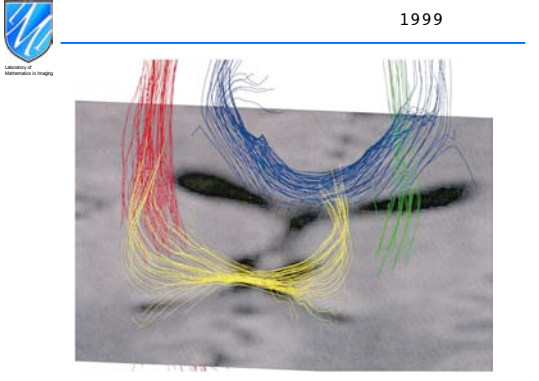
1998



$$x_{k+1} = x_k + \alpha \hat{v}_k$$

$$v_{k+1} = T(x_{k+1})v_k$$

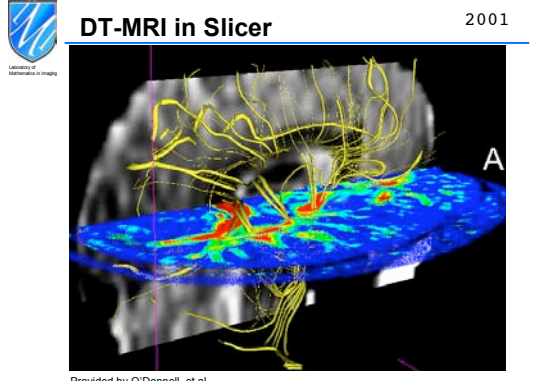
1999



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**DT-MRI in Slicer**

2001



Provided by O'Donnell, et al. Brigham and Women's Hospital, Harvard Medical School

**Multimodal Imaging, DT-MRI, fMRA, ..** 2002

-7-

**Diffusion Tensor MRI in Neurosurgery** 2002

F. Taitos  
Brigham and Women's Hospital, Harvard Medical School

-8-

**Fiber Bundle Color Coding** 2003

Laplacian Eigenmaps: Map the three smoothest eigenvectors to colors Red, Green, and Blue

Provided by A. Brun  
Brigham and Women's Hospital, Harvard Medical School

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**Fiber Bundle Color Coding** 2003

-10-

**Grouping fibers into meaningful bundles** 2004

Uncinate fasciculus (green), inferior occipito-frontal fasciculus (red)

Provided by Marek Kubicki  
Brigham and Women's Hospital, Harvard Medical School

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**Fibers to bundles: Splenium of Corpus Callosum** 2004

Splenium of the corpus callosum interconnecting different regions: occipital lobes (green), temporal lobes (red) and thalamus (blue).

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-12-

**Fiber Bundle Segmentation** 2004

Fiber bundle clustering using Normalized Cuts

Provided by A. Brun

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**Fiber Bundle Segmentation** 2004

Provided by L. O'Donnell

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Research

Home Personnel Research Publications Collaborators

<http://lmi.bwh.harvard.edu>

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**END**

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**Statistical Atlas of Diffusion Quantity**

Generation of DT-MRI Template  
DT-MRI from Healthy Subjects N=32

Registration using Tensor Information to a Tensor Template

Average/Median of Registered Tensor Images

Fiber Tracking

Single Brain T2 FA Map

Average Brain

Single brain Group average

Park HJ et al. Neuroimage, 2003

**Gray Matter Parcelation**

Provided by Hae-Jeong Park

-18-