GGSWBS

JÜLICH
FORSCHUNGSZENTRUM

fz-juelich.de

Experience 3 weeks in Forschungzentrum

From 12.11.12 to 01.12.12

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GTU

Faculty of Informatics and
Control Systems

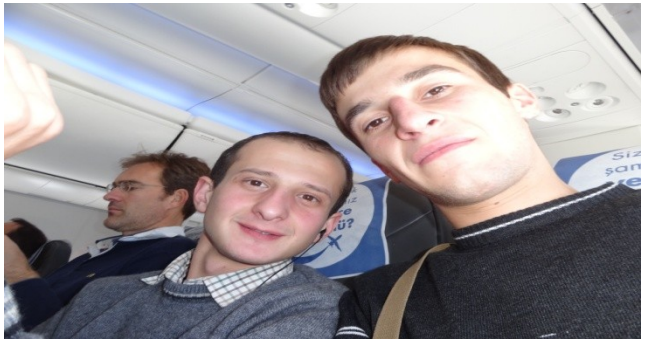
Advisor: Qetevan Kotetishvili

How we involved:

- Begin in Tbilisi

- Then was summer school in Batumi

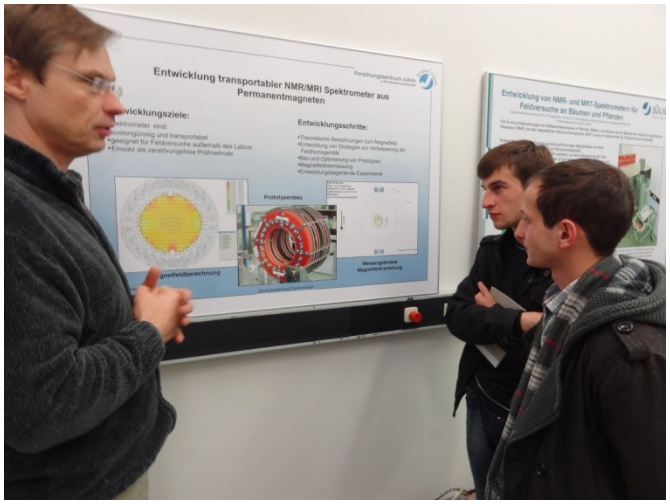
- Then flight



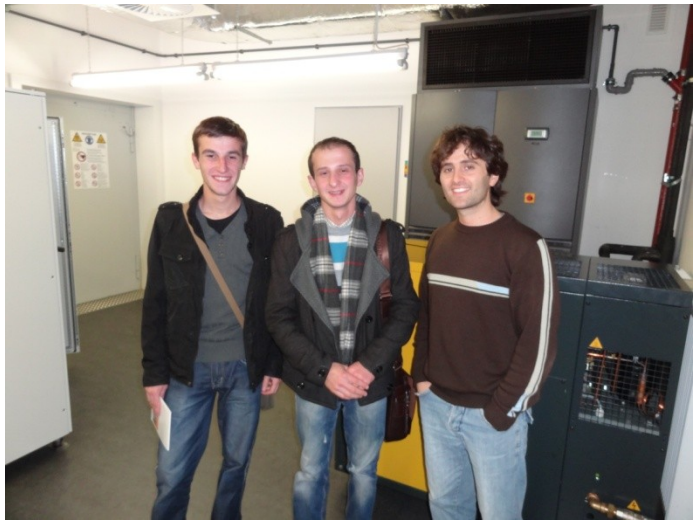
Introducing day in FZJ

See IKP and COSY

Dr. Andro Kacharava explained us every necessary information



Dr. Helmut Zoltner presented part of **ZAT**



Were in **INM** and Ezequiel showed us their working labs

INM: Institute of Neuroscience and Medicine

Structural and functional organization of the brain (INM-1)

Molecular organization of the brain (INM-2)

Cognitive Neuroscience (INM-3)

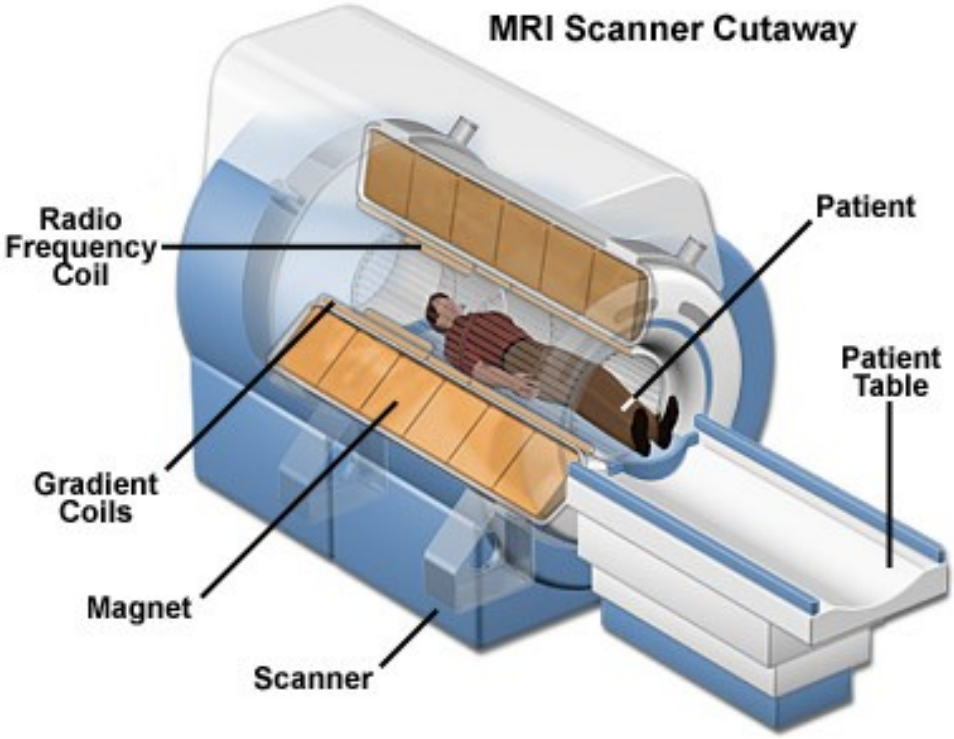
Medical Imaging Physics (INM-4)

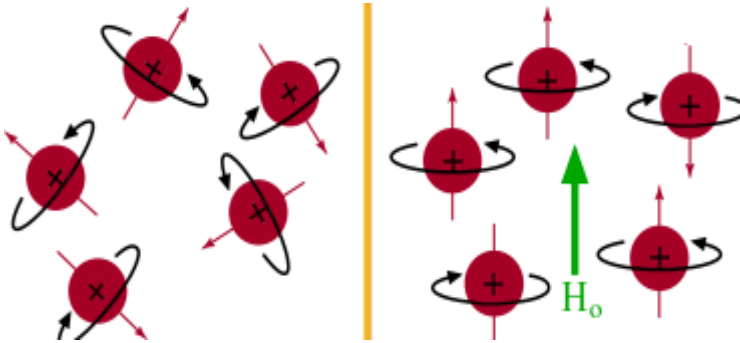
Nuclear Chemistry (INM-5)

Computational and Systems Neuroscience (INM-6)

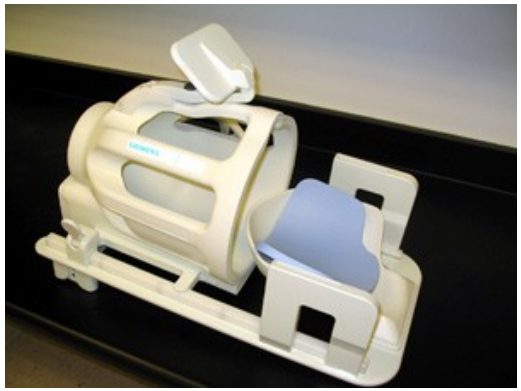
Neuromodulation (INM-7)

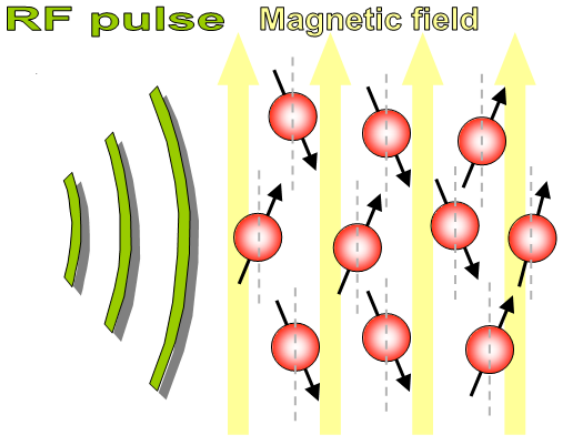
Ethics in the Neurosciences (INM-8)

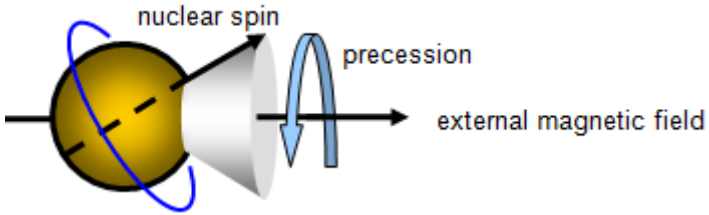




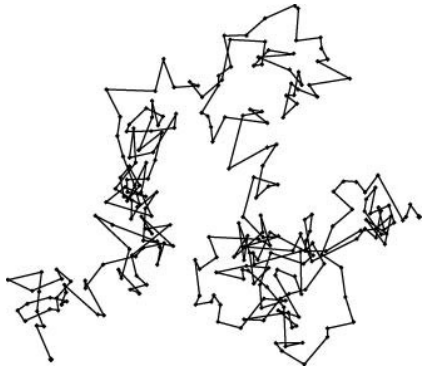
Reception antenna



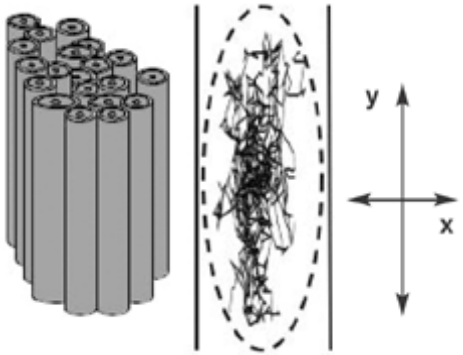




DTI working principle



Isotropic diffusion



Anisotropic diffusion

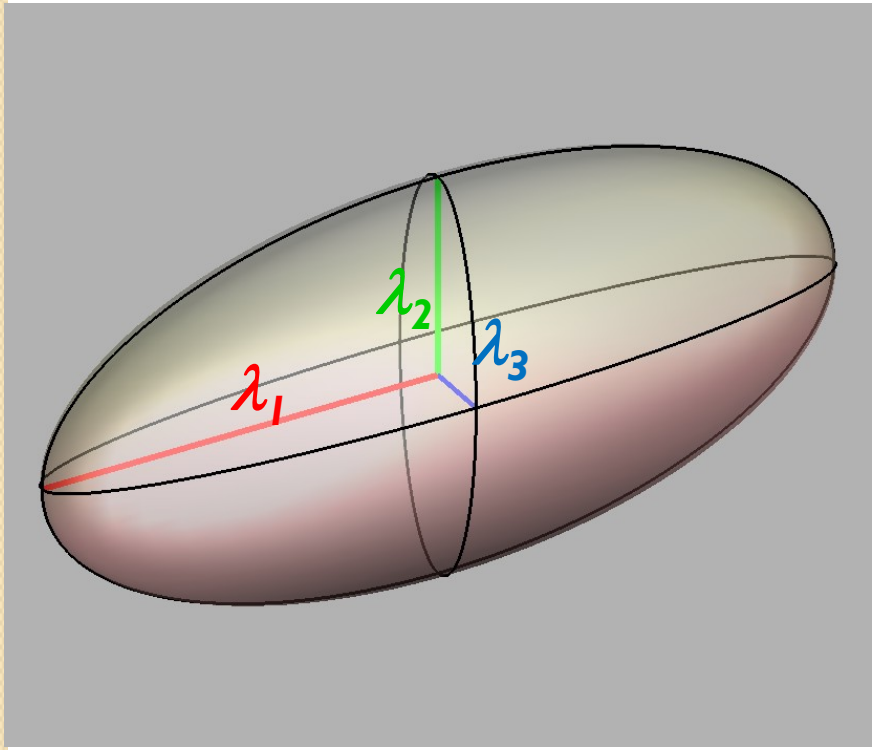
By Einstein's equation:

$$\langle \Delta x^2(t) \rangle = 2Dt$$

Traveled distance in ***t*** time
(what we measure with MRI)

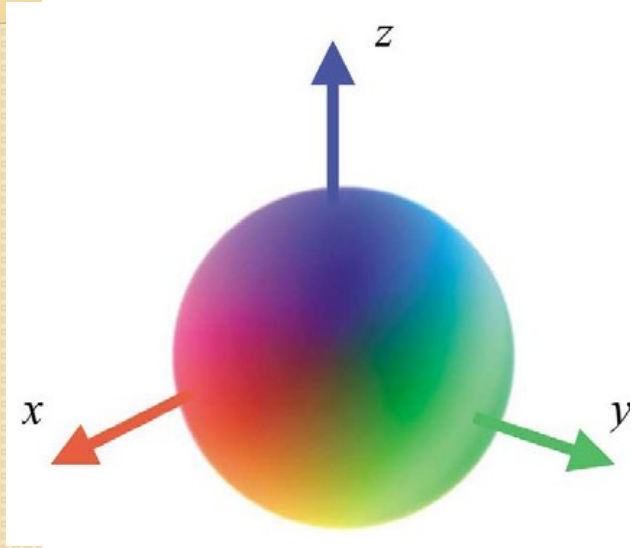
Diffusion coefficient
(what we infer from the MRI measurement)

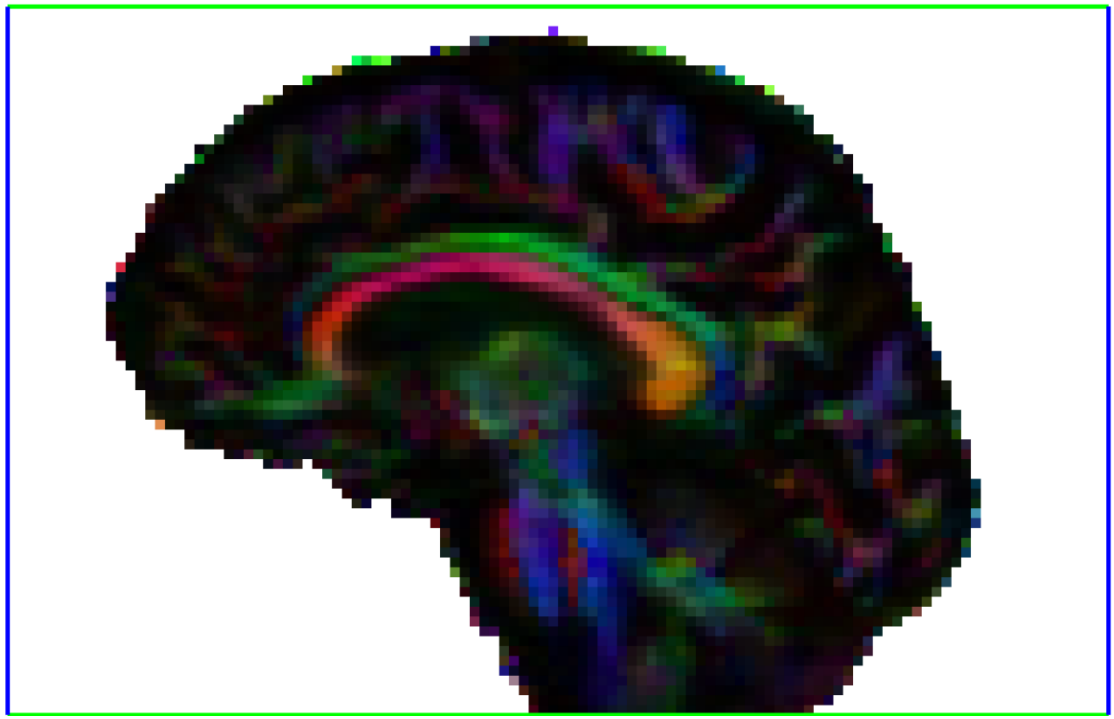
Presenting information by ellipsoid

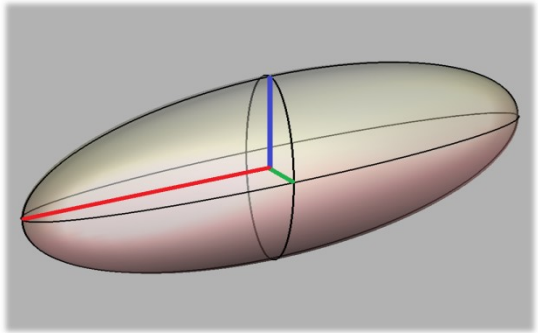


$$D = \begin{pmatrix} D_{xx} & D_{xy} & D_{xz} \\ D_{xy} & D_{yy} & D_{yz} \\ D_{xz} & D_{yz} & D_{zz} \end{pmatrix} = \begin{pmatrix} \lambda_1 & 0 & 0 \\ 0 & \lambda_2 & 0 \\ 0 & 0 & \lambda_3 \end{pmatrix}$$

Presenting information by colors

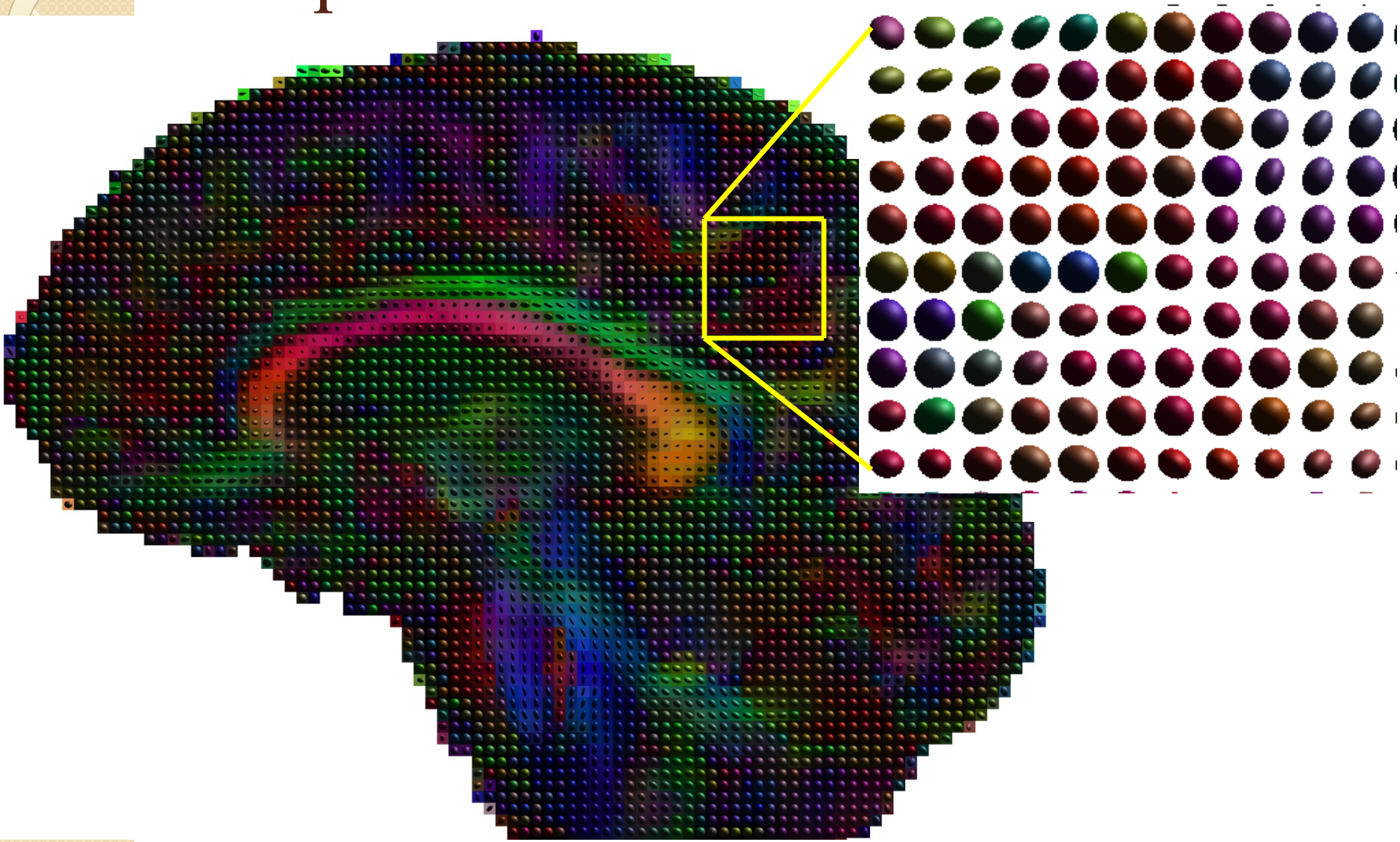




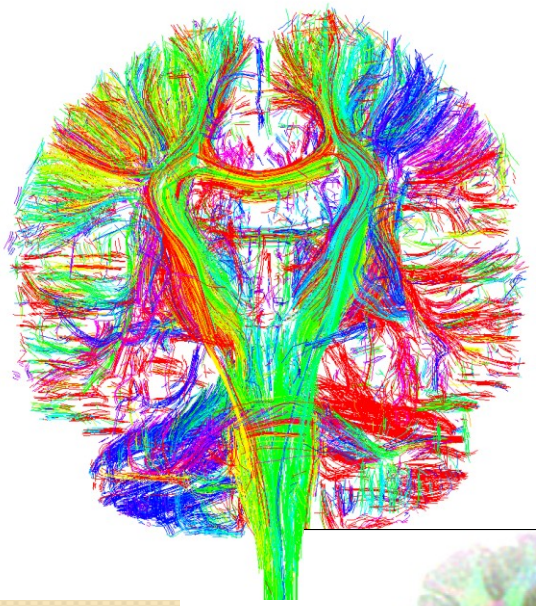


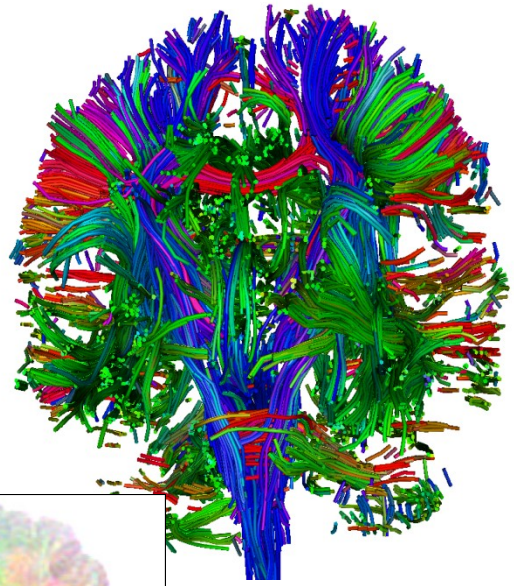
Every ellipsoid color are related to its three main axis

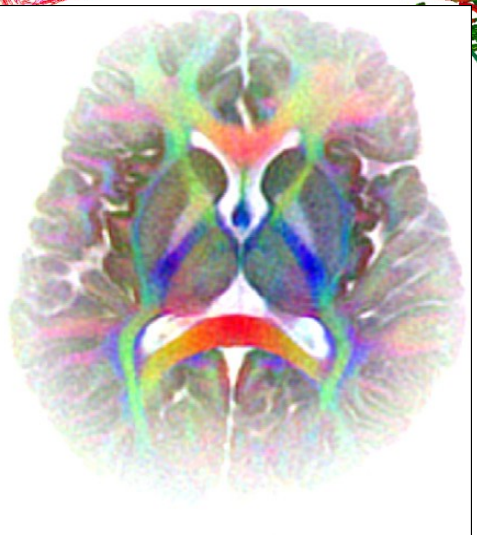
Pixel color determines the ellipsoid's form

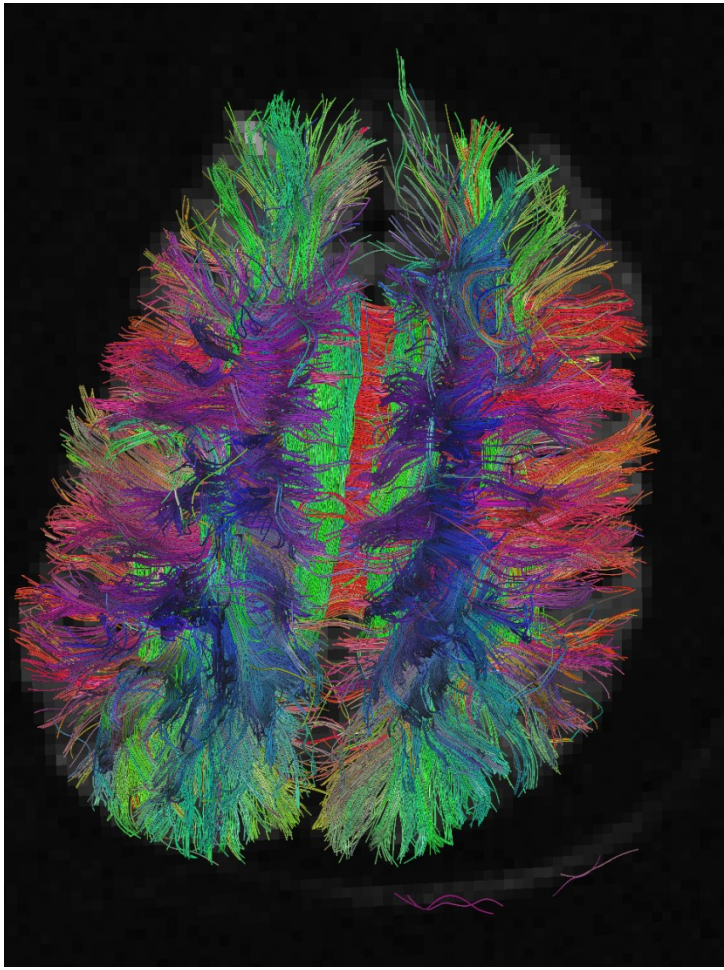


The last face of information

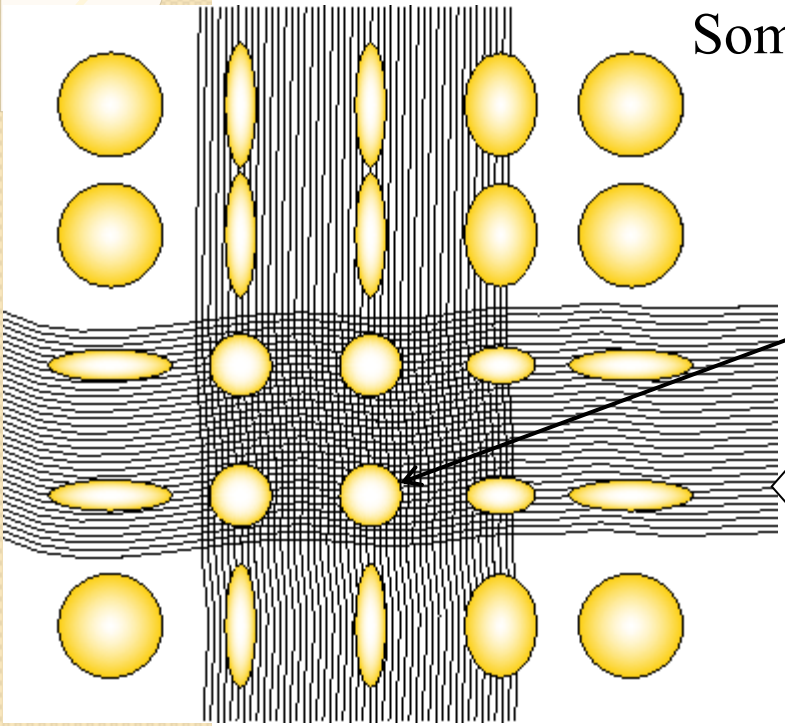




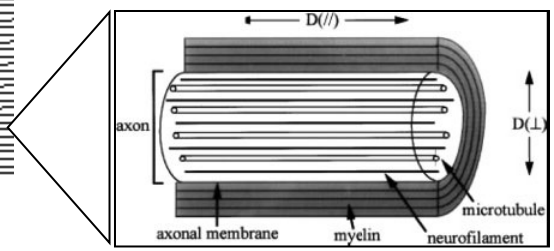




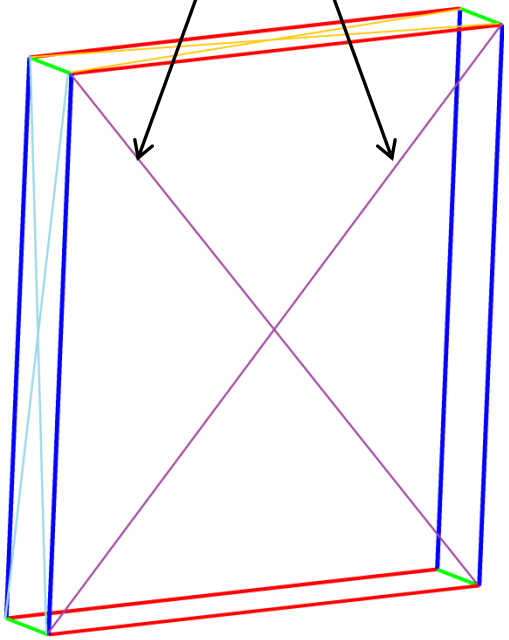
Some problems should be solved



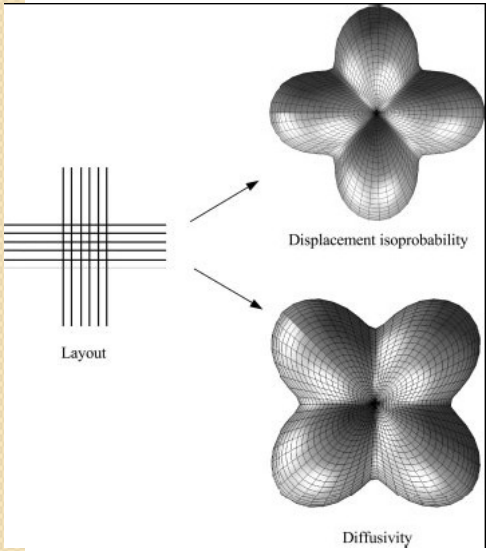
Unknown layout

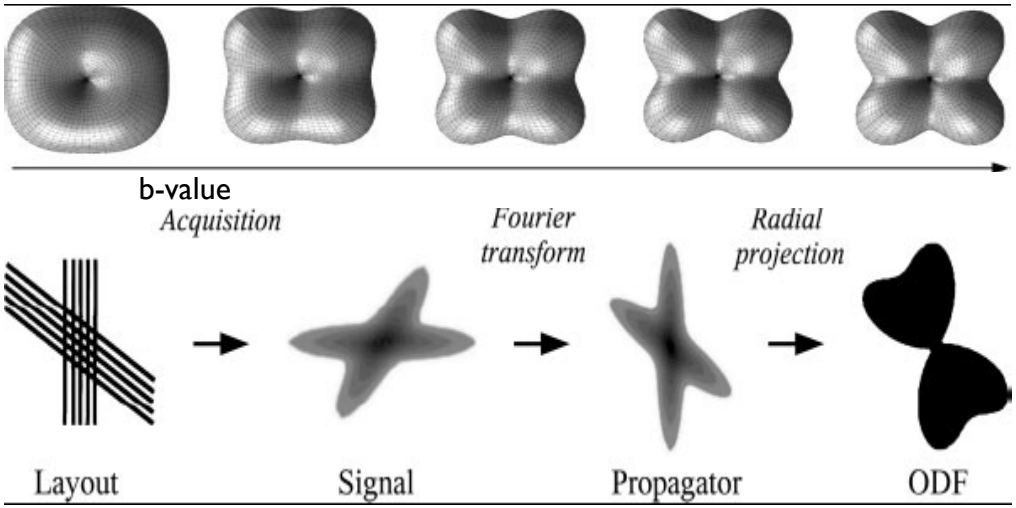


Same colors

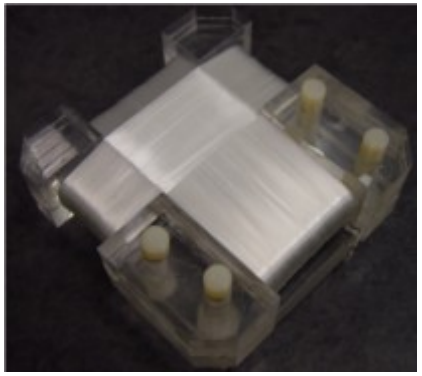


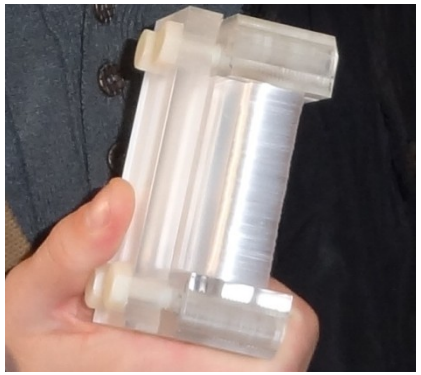
But, some of them are already determined

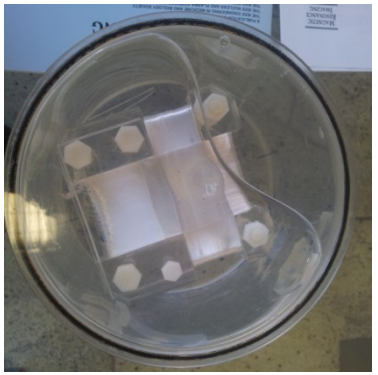




Phantoms for Studies of Anisotropic Diffusion in the Brain





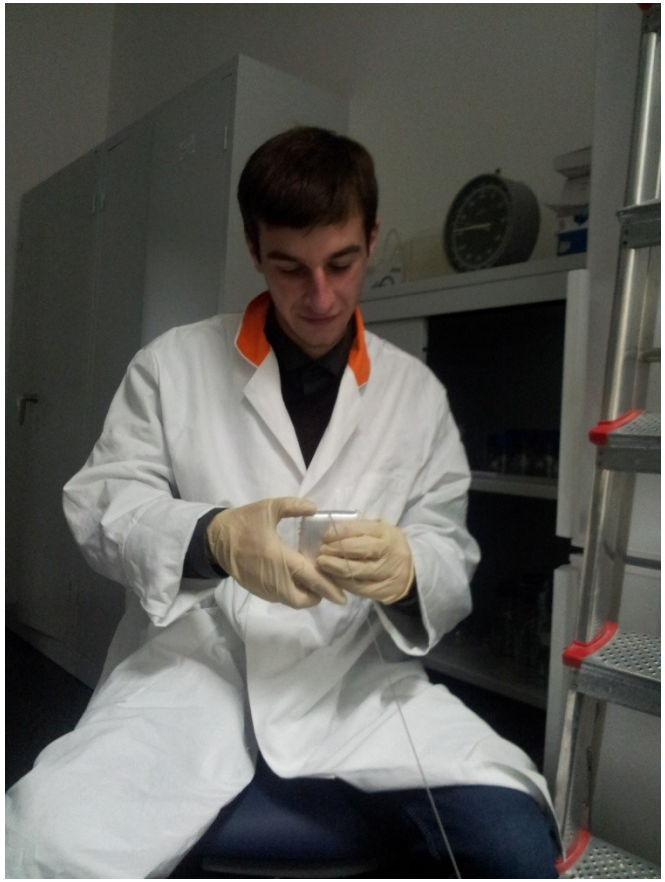


Phantoms are tightly winded ribbons on plastic which will be placed in water and then analyzing water molecules diffusivity by MRI

What we were doing in INM

We made new experiment on phantom:

Winded ribbon on plastic tighter than on other phantoms



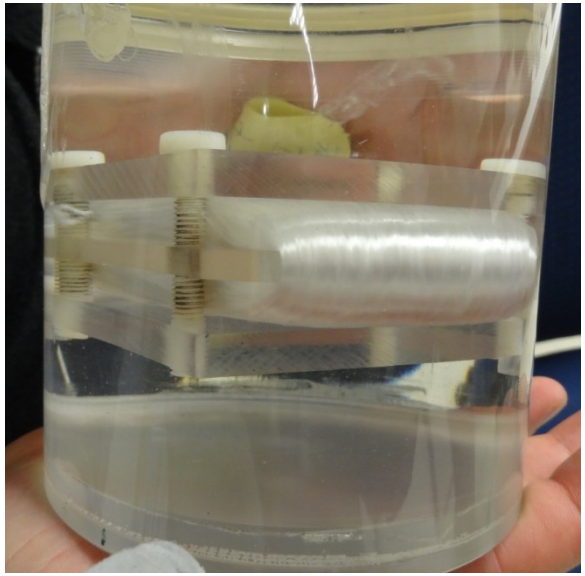
New phantoms:

Ribbon layers – 45

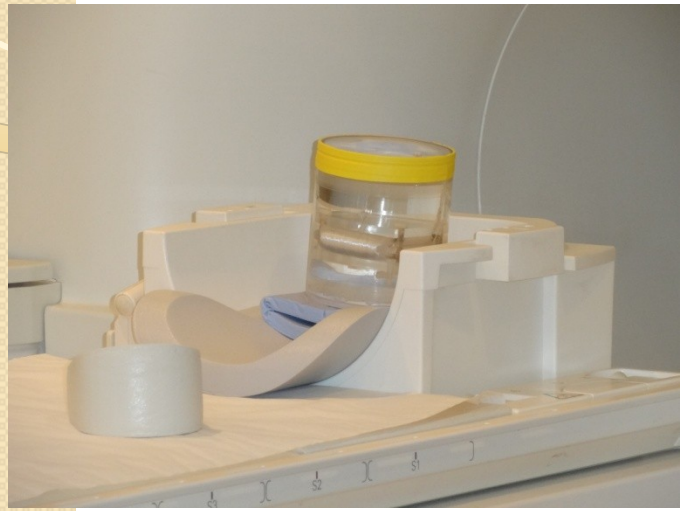
Ribbon rounds – 1880

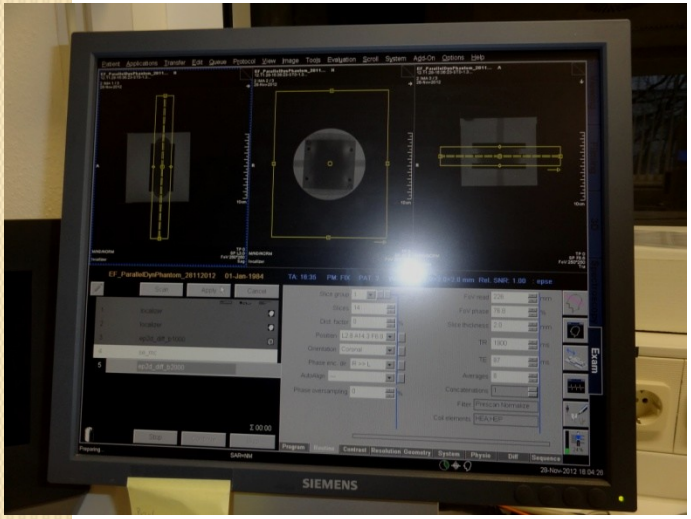
Thickness – 19mm

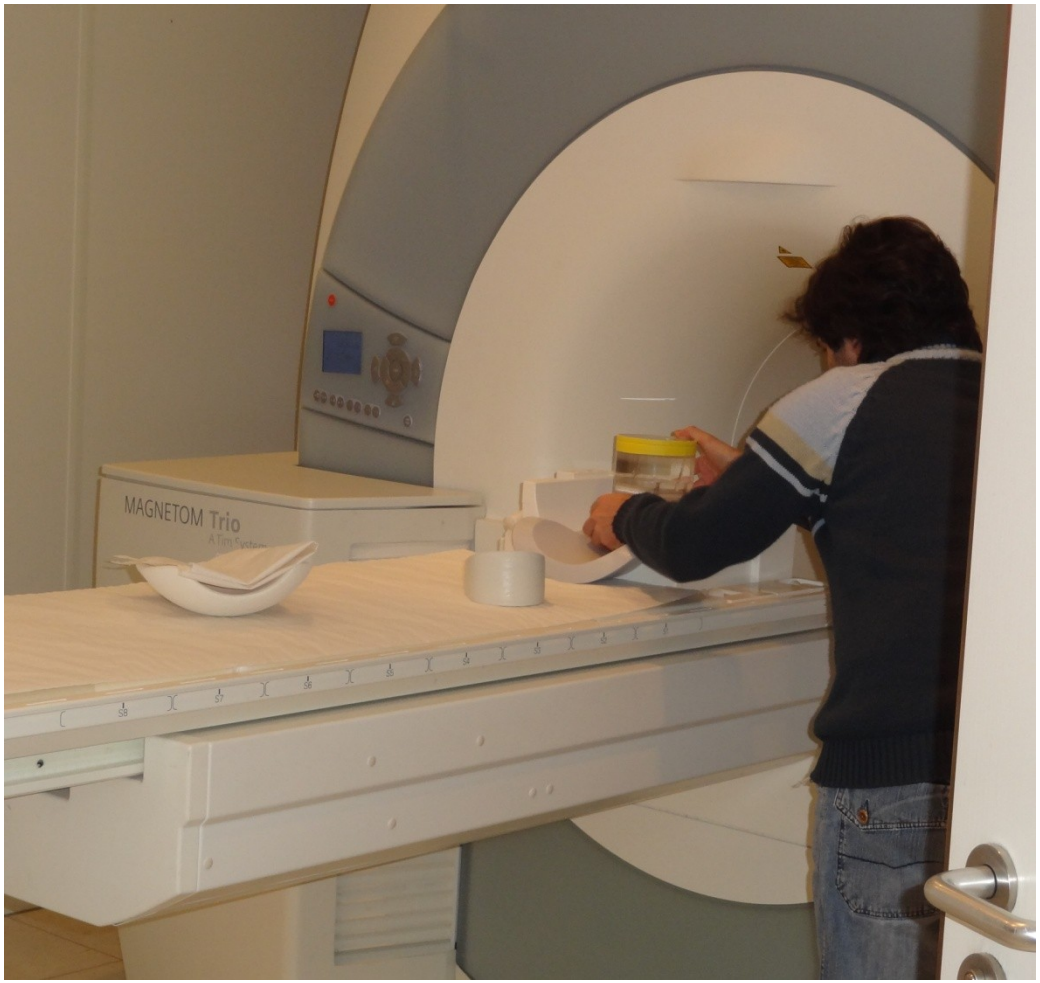
After winding we cut some plastics for attaching put it in water box and then placed it in vacuum for removing air bubbles



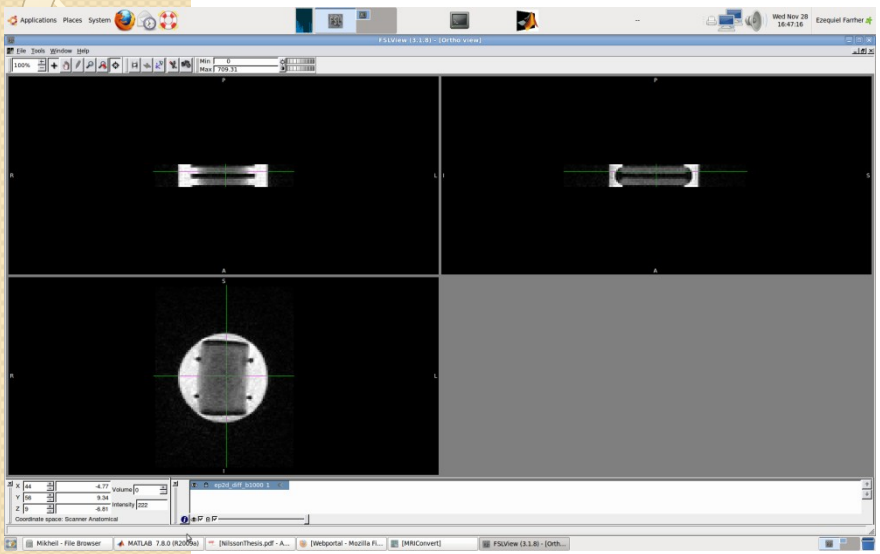
MRI measurements

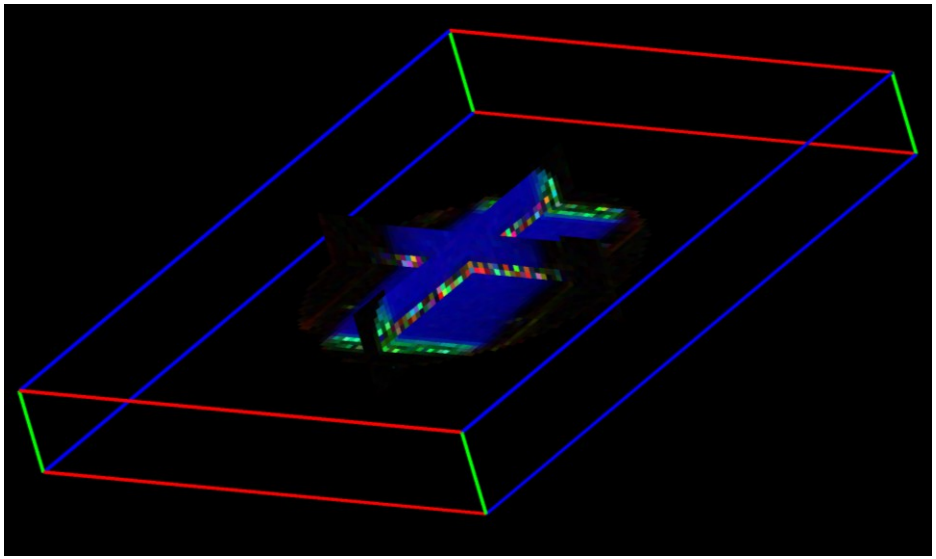


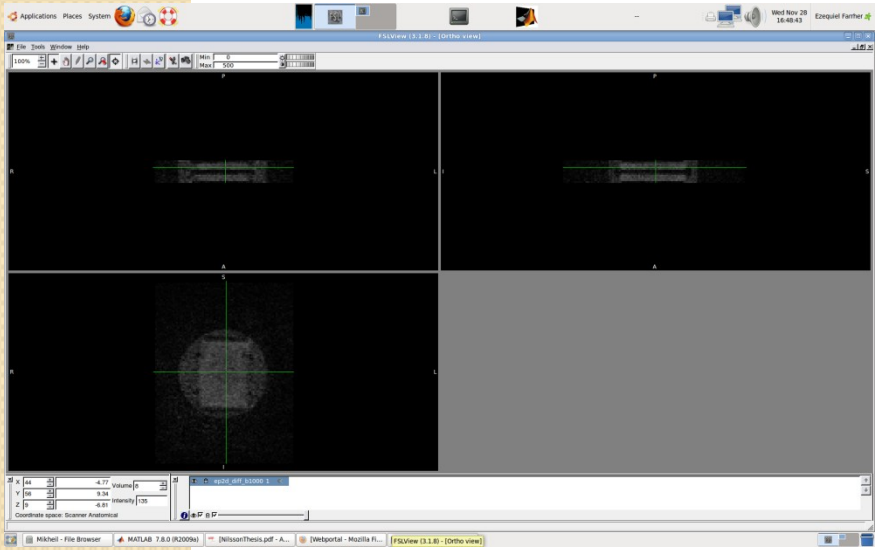


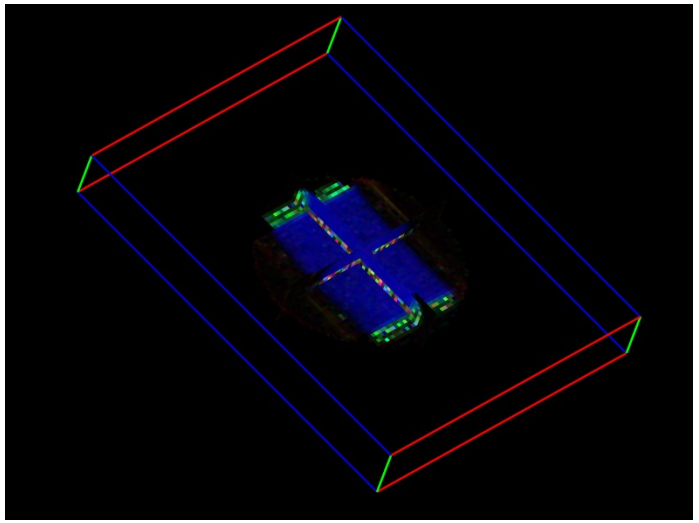


Getting information from MRI

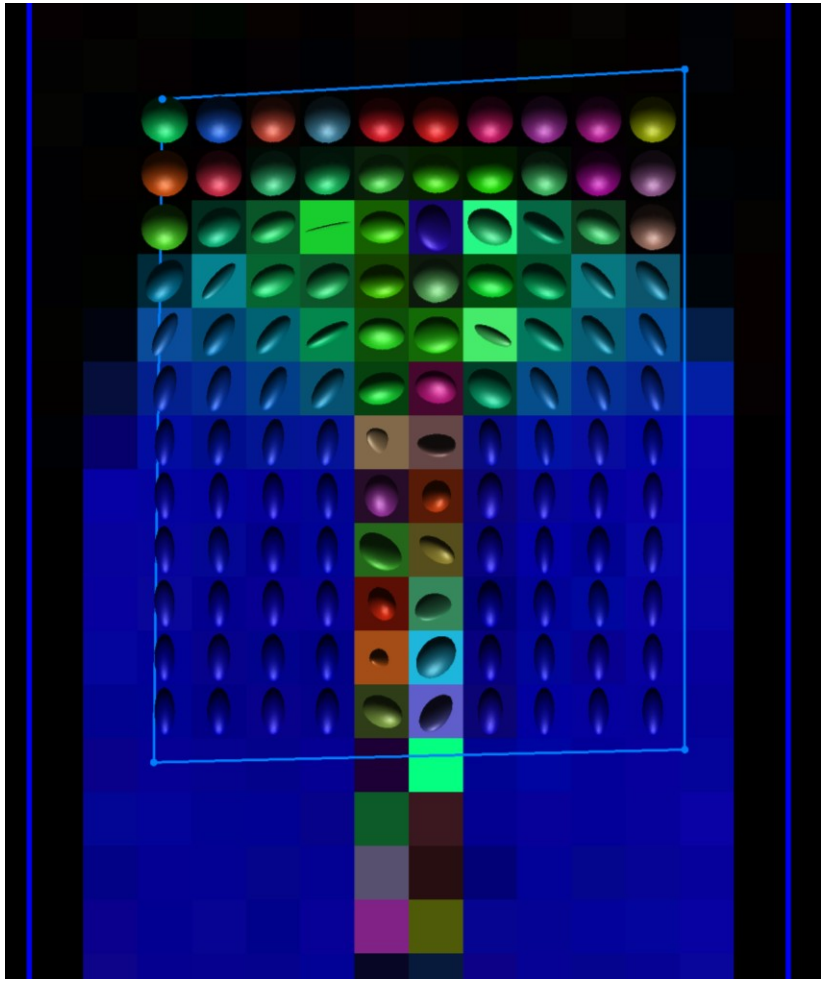


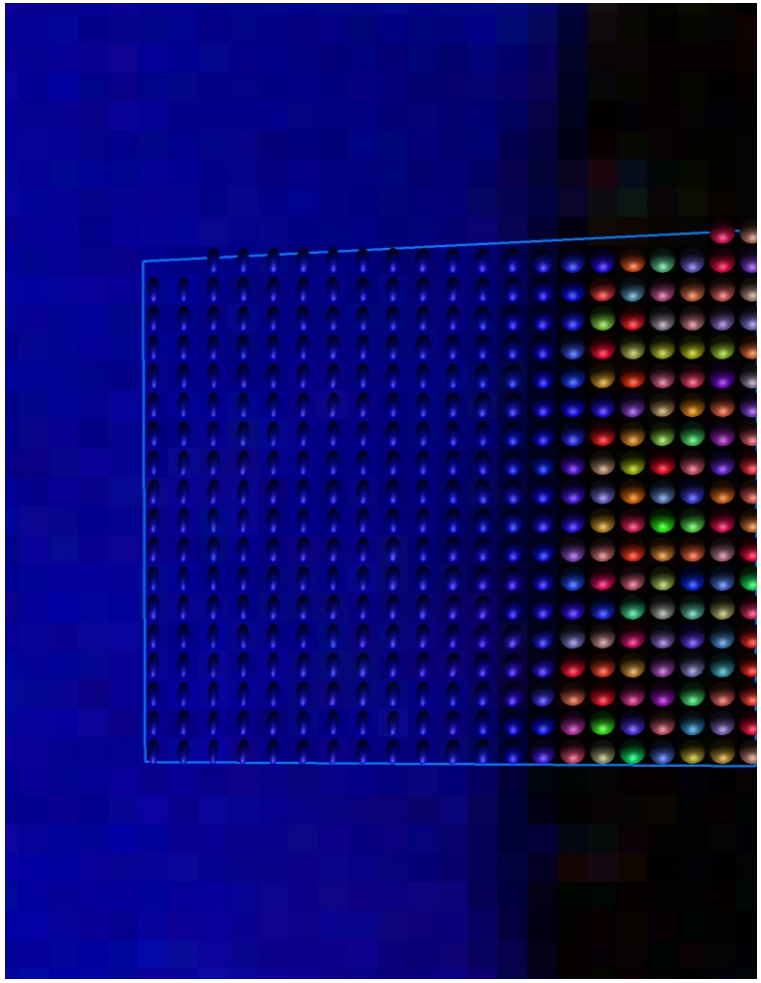




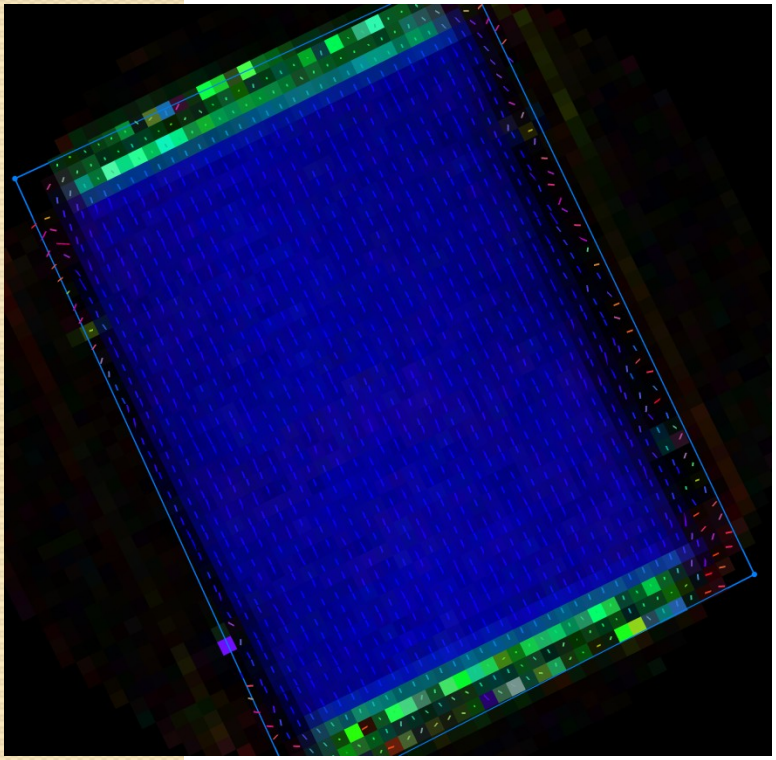


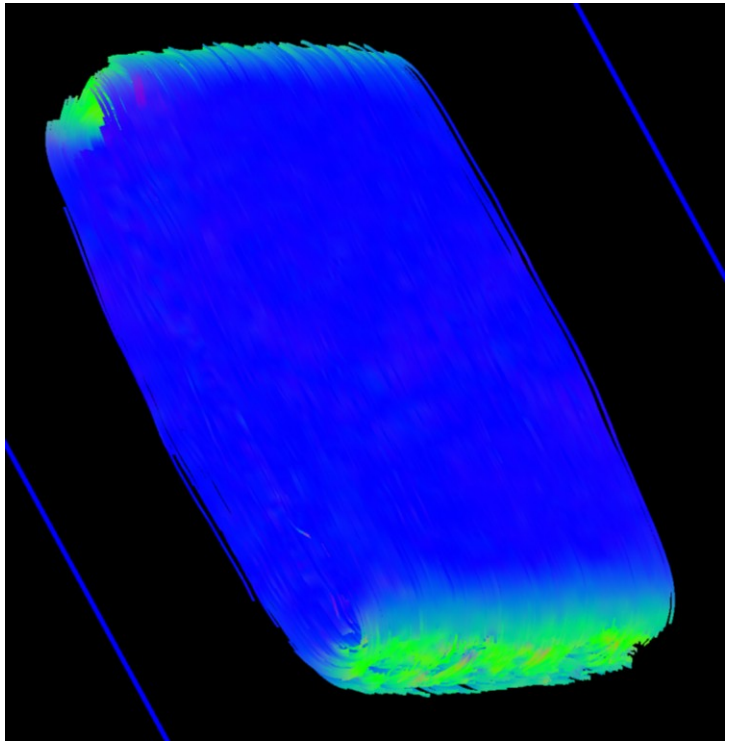
How to determine fiber directions

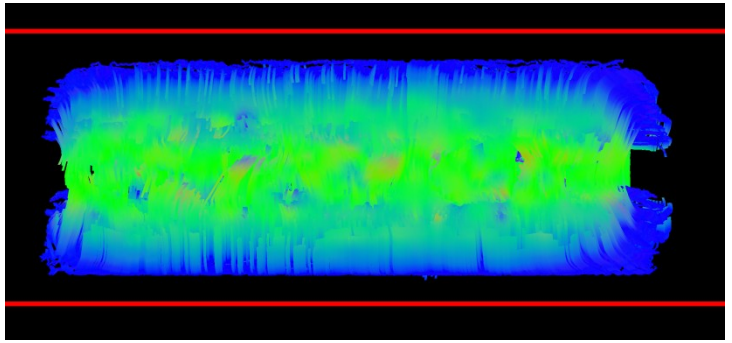




Analyzing information







At the end of presentation

Thankful:

Prof. Dr. Hans Stroeher, for inviting us in FZJ and gave us chance for getting good experience

Dr. Andro Kacharava, for guiding us and introducing everything in FZJ

Prof. Ketevan Kotetishvili for leading us and giving necessary informations

Prof. Dr. Jon Shah, Dr. Farida Grinberg, Ezequiel Farrher and Dr. Helmut Soltner, for giving us opportunity involved in their practical activities

Thank you for your attention

Any questions?