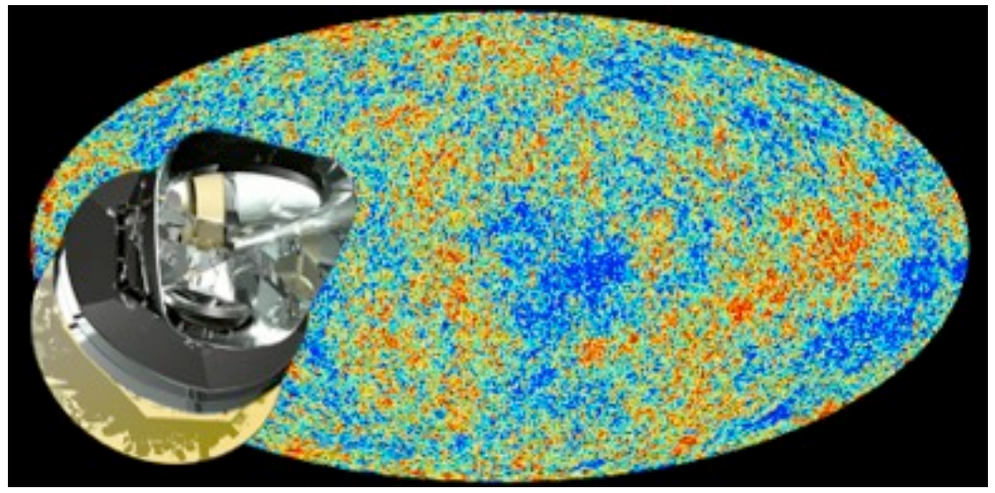
BRAINLAB

My life after astrophysics

Mona Frommert
working as a software engineer for Brainlab since 2012

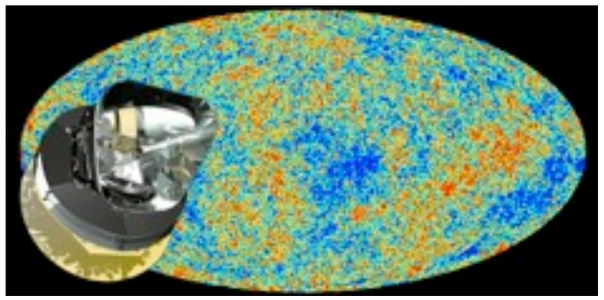
My story



I did the PhD at MPA for fun

- because I was very interested in Cosmology
- I wanted to learn as much as possible about our Universe
- but I was never sure whether I wanted to be a researcher

=> I've had the "plan B" to go into medical imaging for a long time
=> I tuned my cv a bit towards that



My story

- Nov 2005: Diplom in Physics, University of Heidelberg (Quintessence)
- Dez 2005 - Mai 2006: Werkstudent at Siemens Medical (programming)
- 2006 - 2010: PhD at MPA with Torsten Ensslin (ISW-effect, axis of evil, parameter sampling)
- After handing in the thesis: Small medical imaging project with Christoph Raeth from MPE

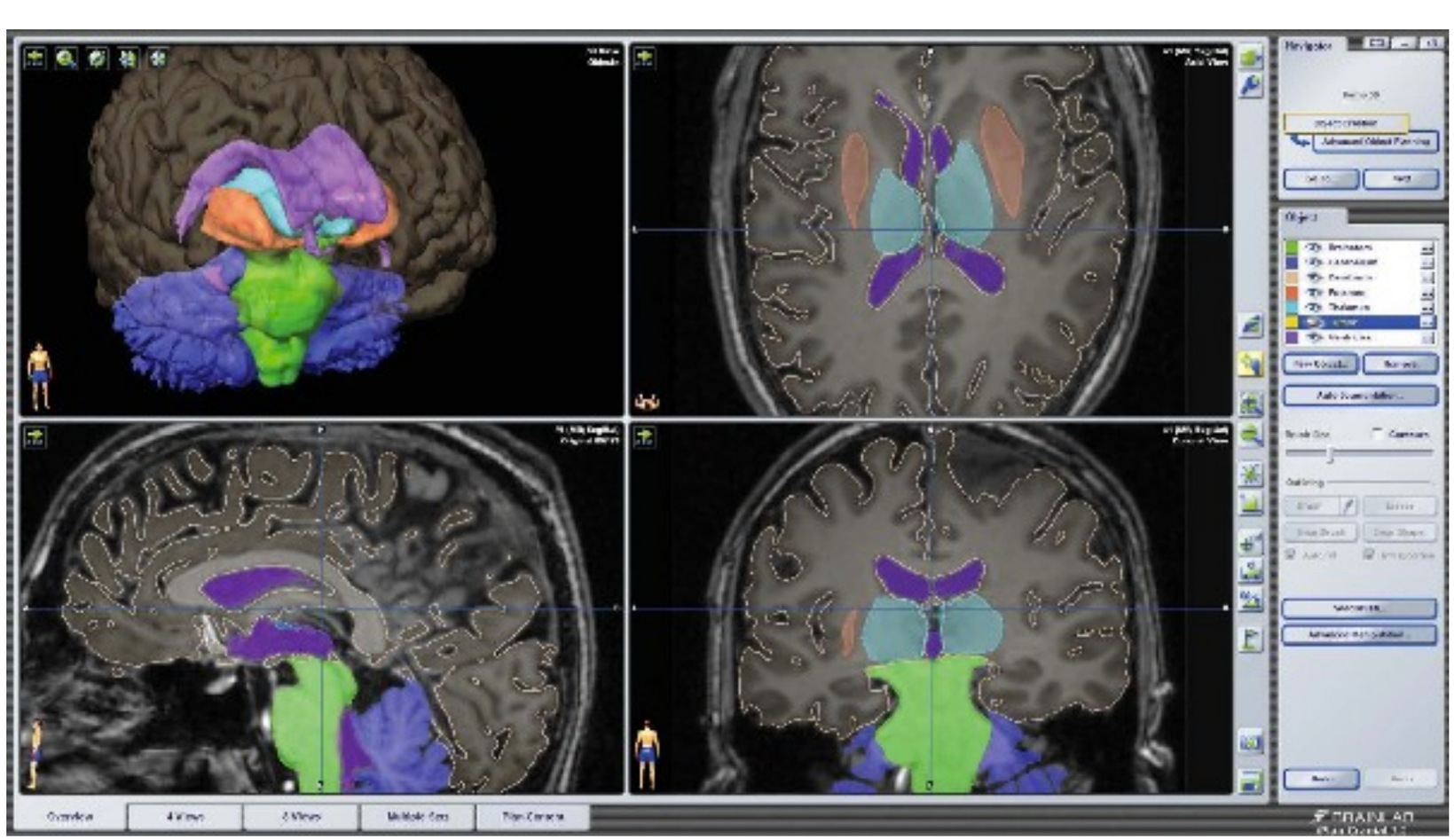
(analyzing the morphology of trabecular bone, talk at SPIE medical imaging conference)

- 2010-2012: Postdoc at the University of Geneva (Planck, CMB)
- 2012 - now: Brainlab, Feldkirchen, programming

What does Brainlab do?

Products

- Software for hospitals
- Navigation systems for image-guided surgery
- Software for Radiotherapy
- intraoperative imaging platforms



What does Brainlab do?

Products

• Navigation systems for image-guided surgery => can be used for Neurosurgery, ENT (HNO) surgery, CMF (Mund-Kiefer-Gesichtschirurgie), Knee/Hip replacement, Spine / Trauma surgery

Orientation of the patient in space
=> see the instruments in the brain scan

3 IR-reflecting spheres

IR-camera

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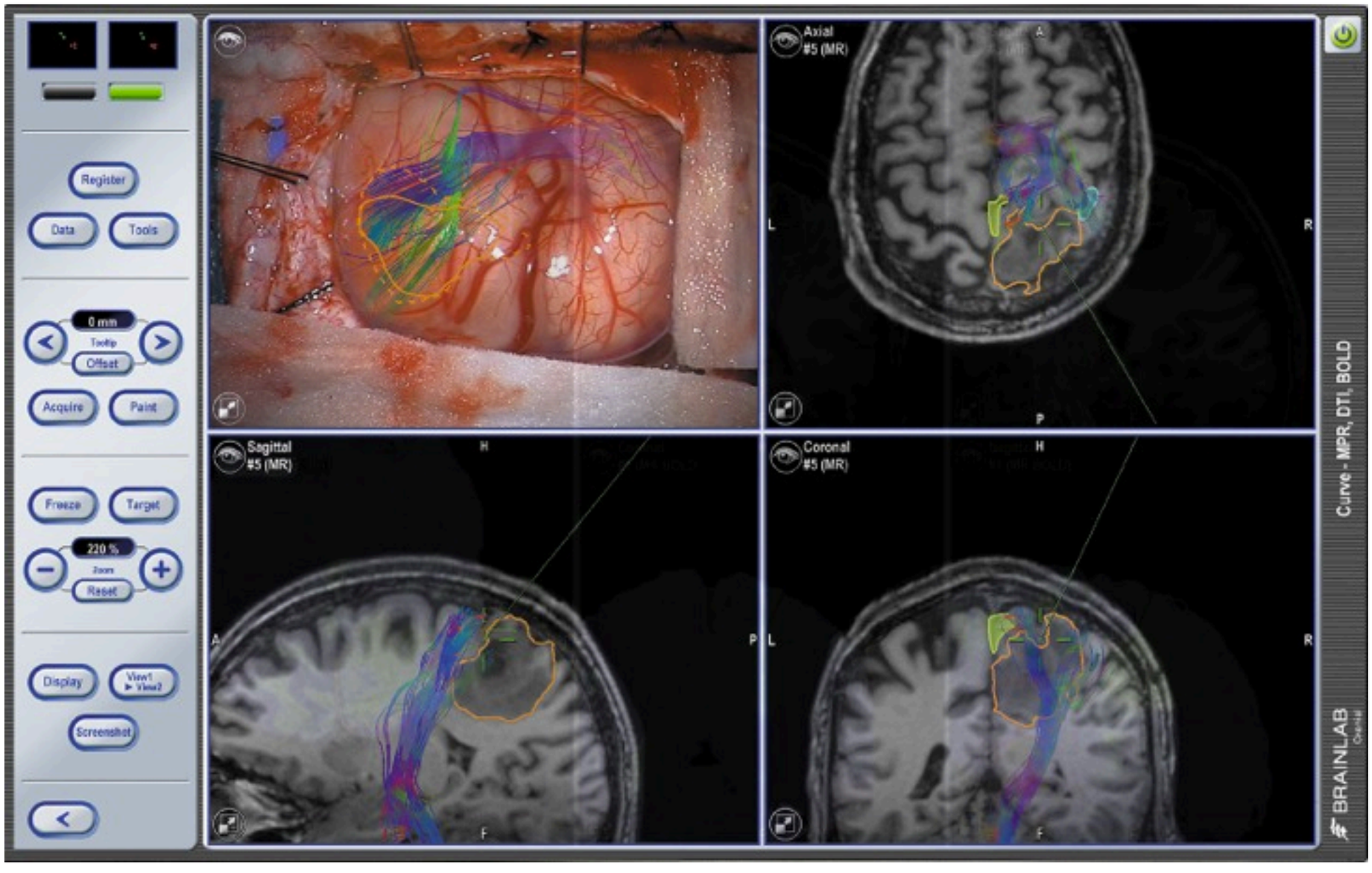

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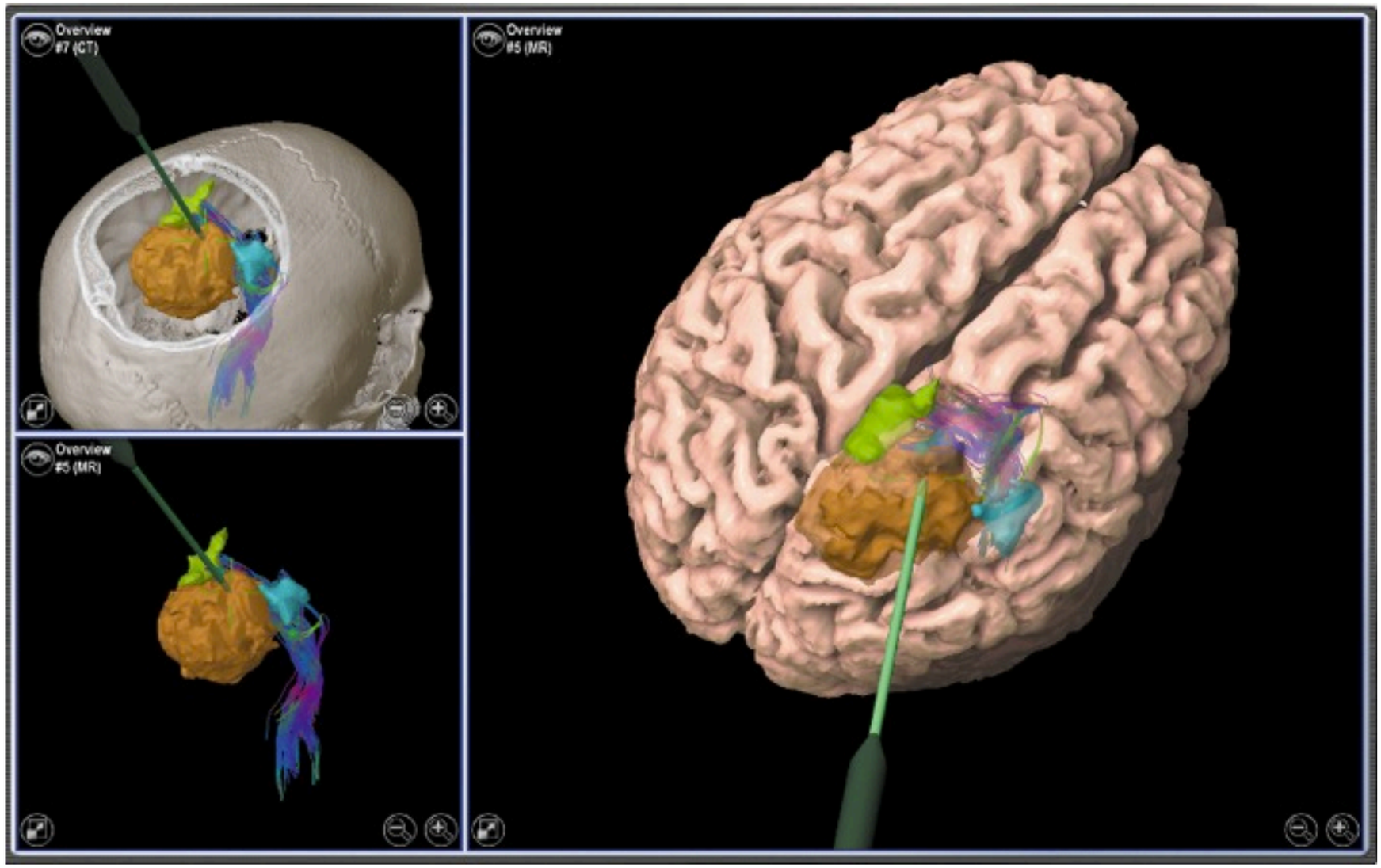

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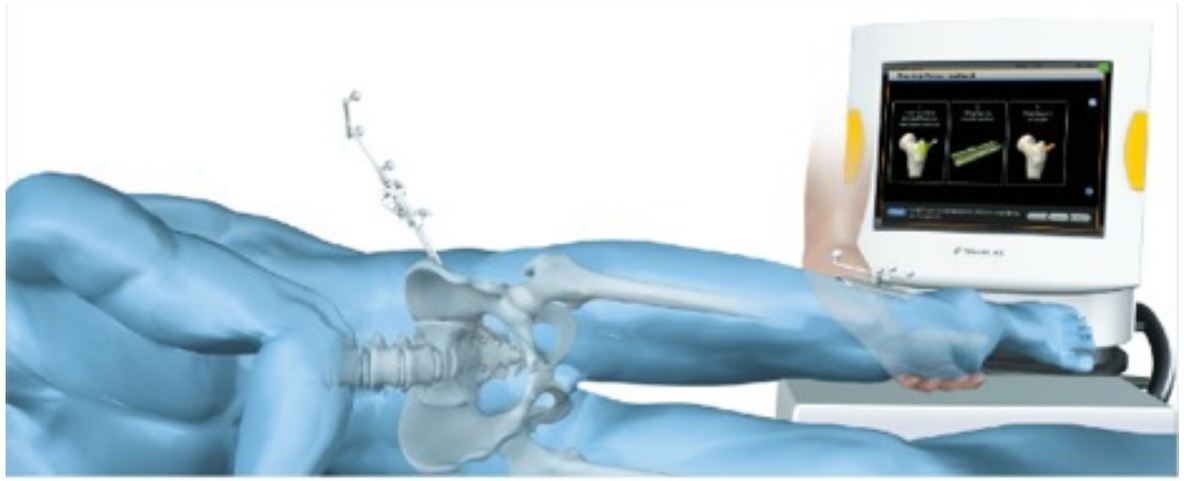

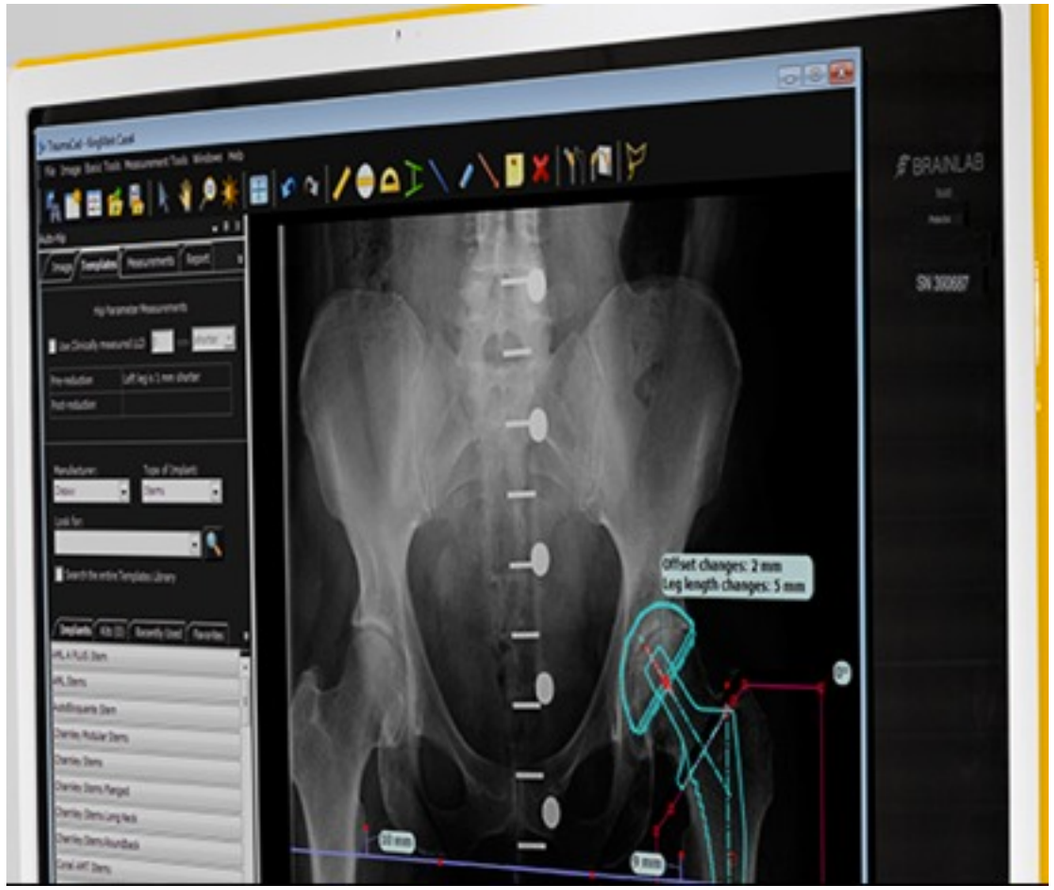

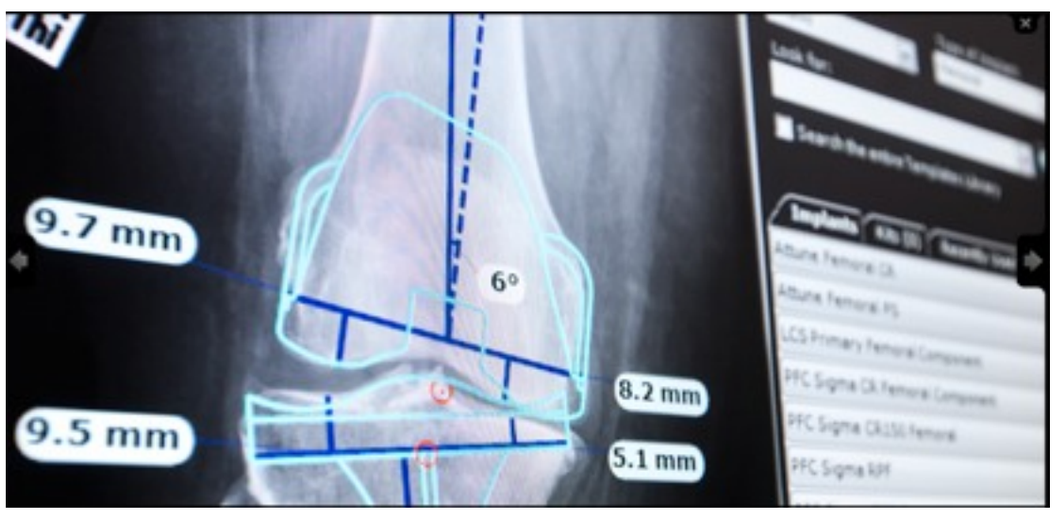

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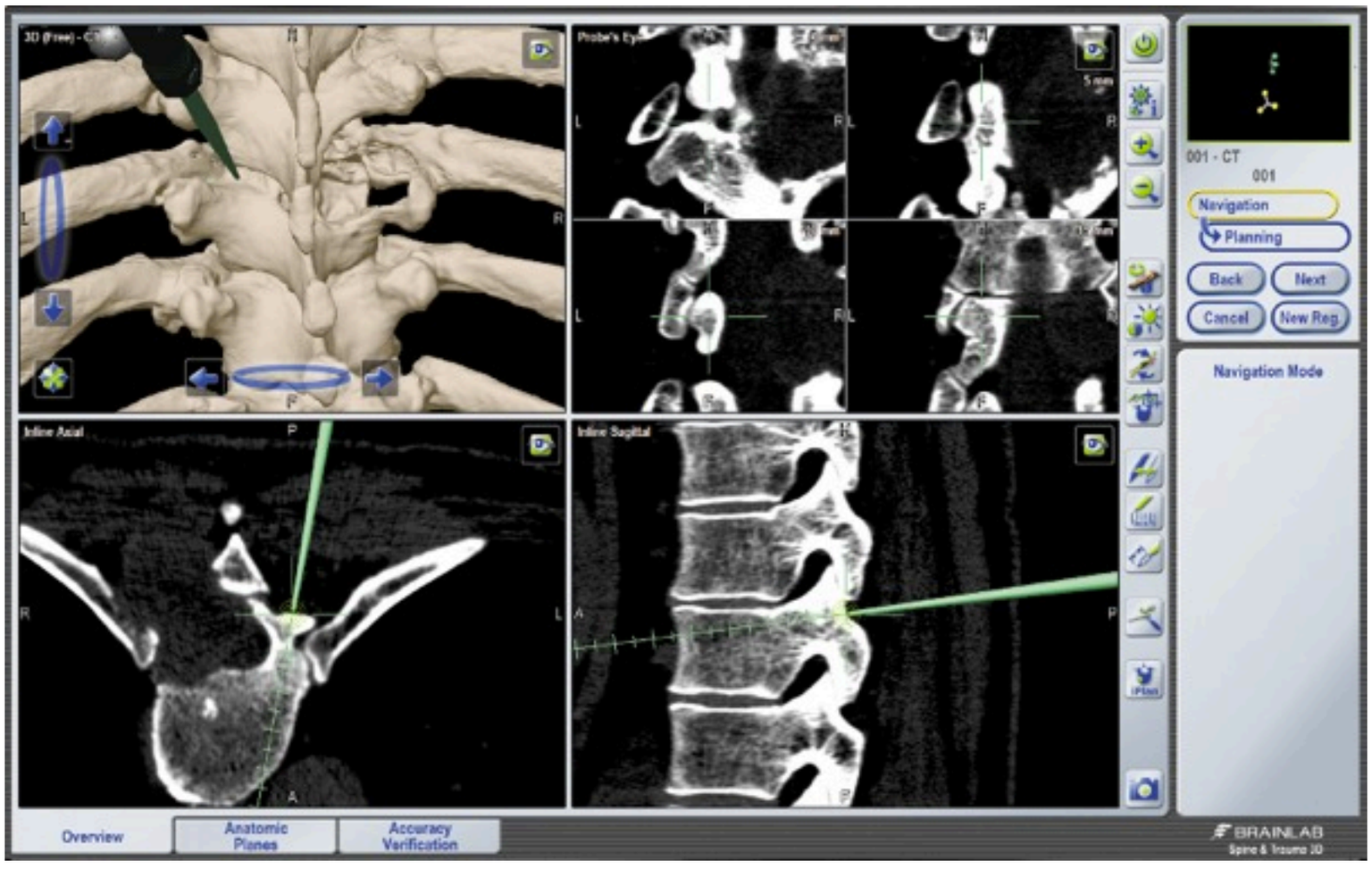
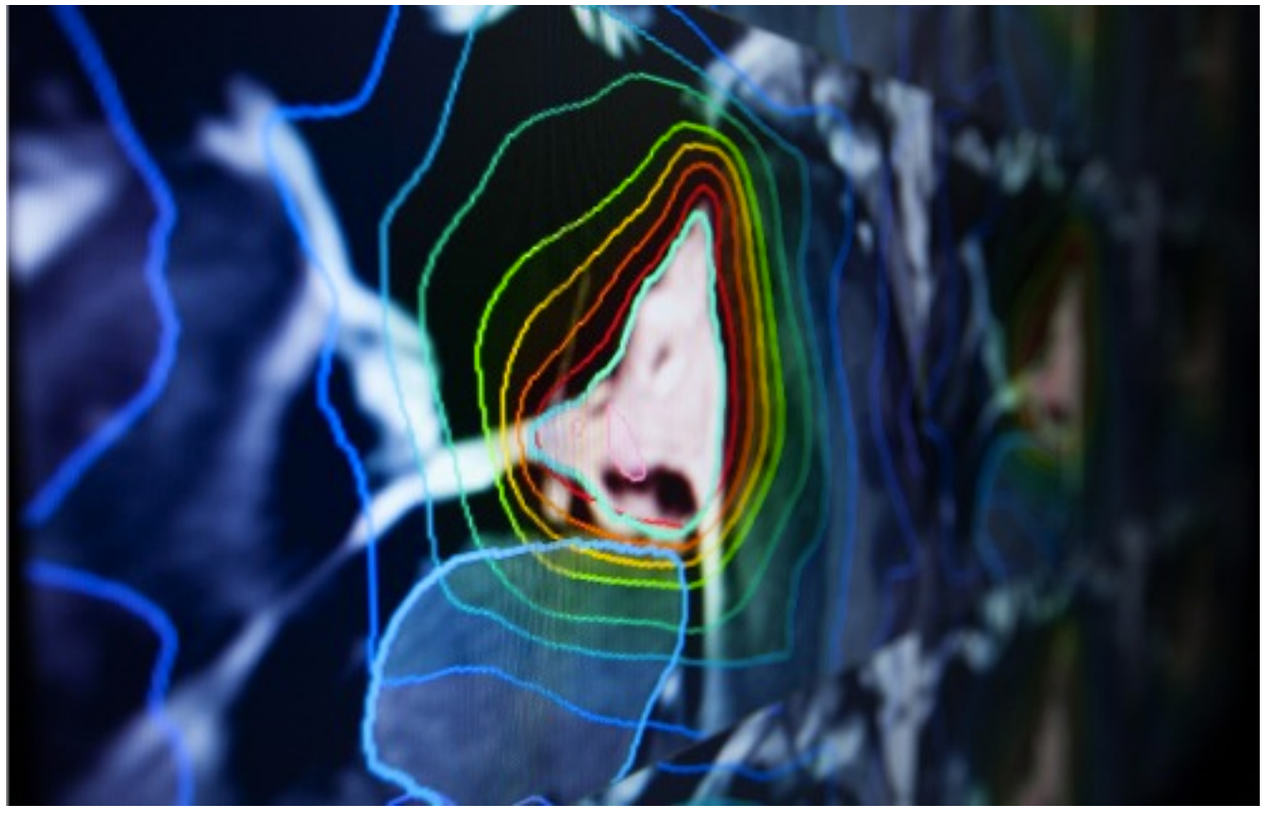


What does Brainlab do?

Products

• Software for Radiotherapy (treatment planning, tumor outlining, Monte Carlo dose calculation algorithms)



What does Brainlab do?

Products

- intraoperative imaging platforms

What do I do for Brainlab?

Programming!

I'm part of the algorithms team: We're mostly mathematicians and physicists, implementing the basic algorithms that are used in basically all of the Brainlab products:

image fusion
(rigid and elastic)

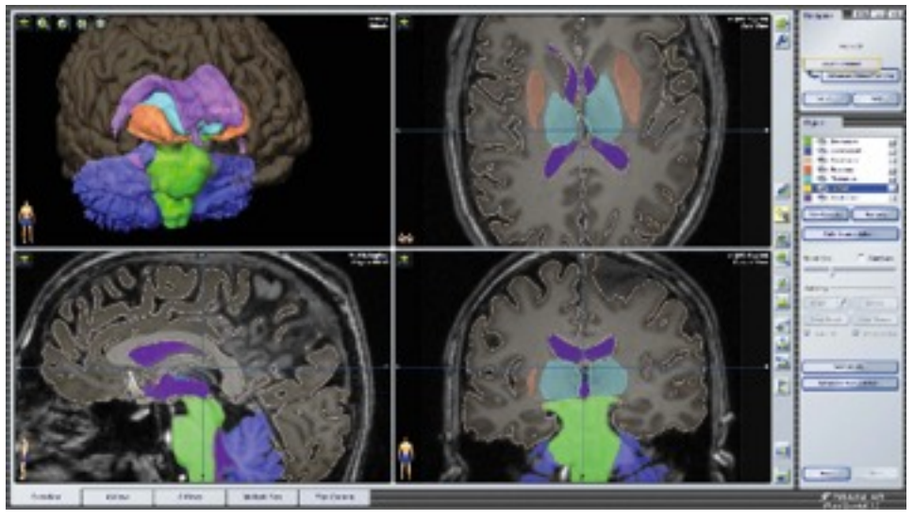
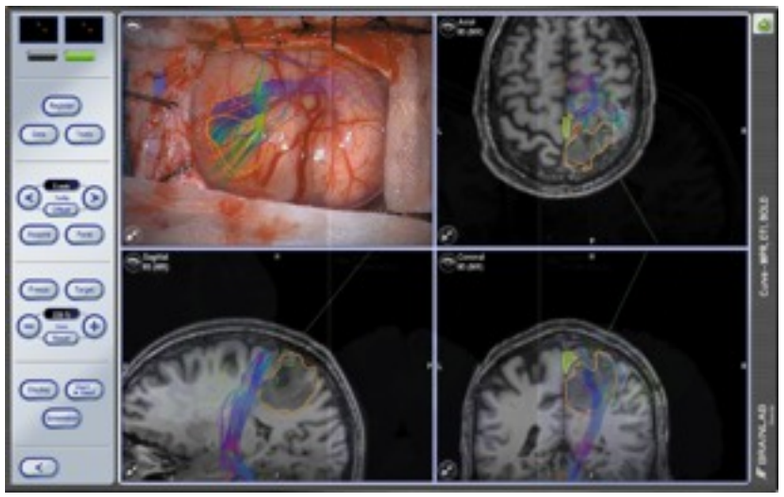
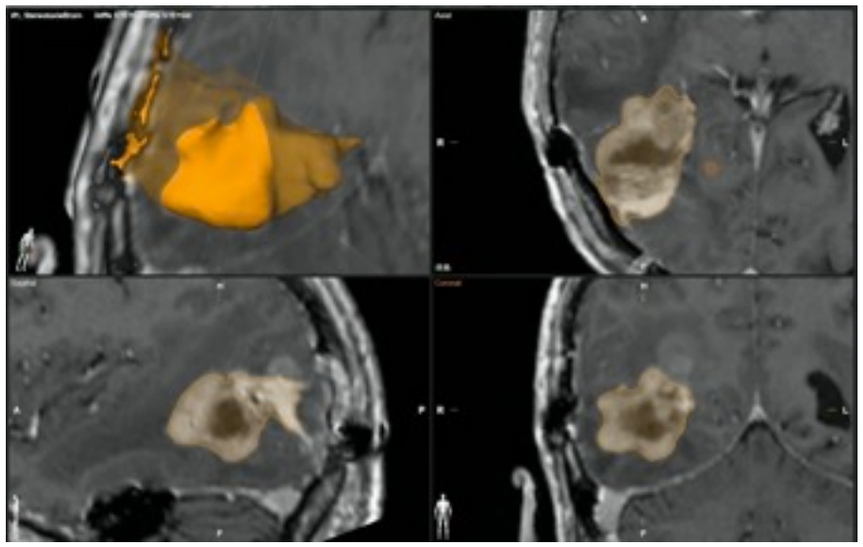


image segmentation
(atlas based, EM-algorithm, other)



fiber tracking

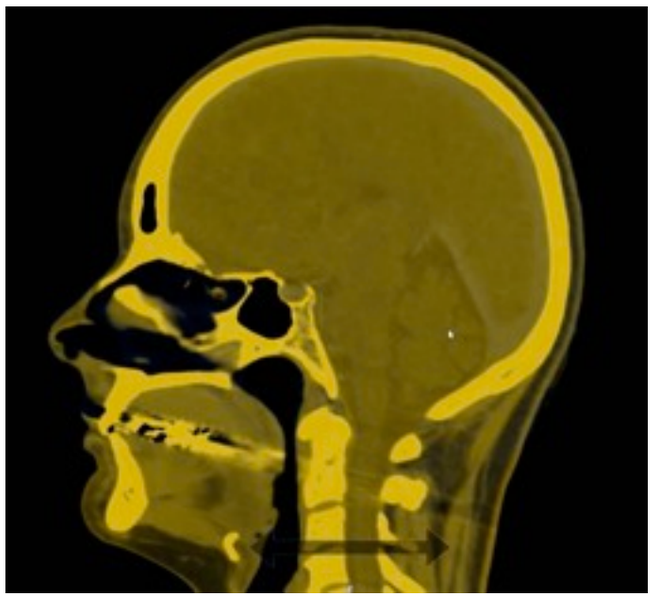


semi-automatic tools for outlining tumors,
automatic tumor detection

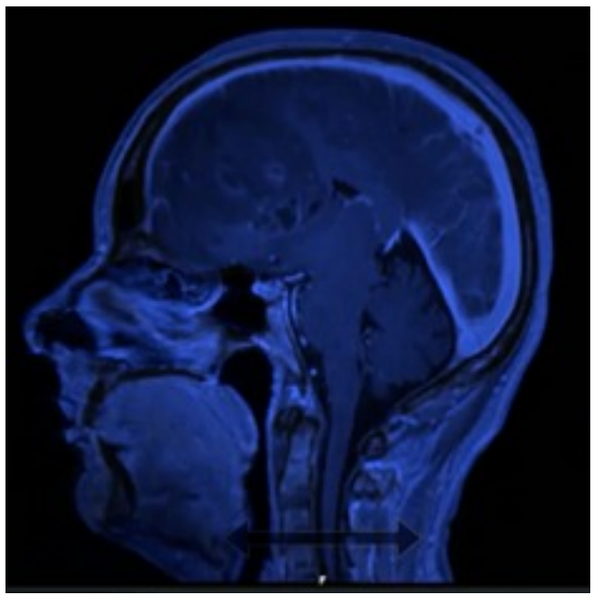
What do I do for Brainlab?

Image fusion:

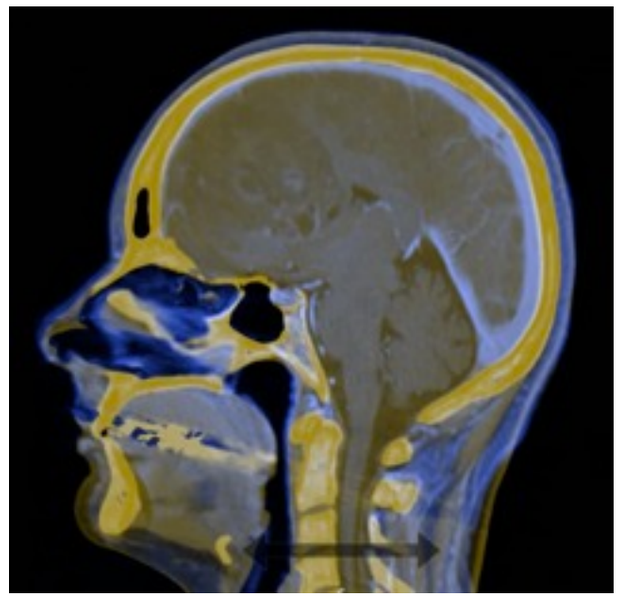
- align 2 images on top of each other by maximizing cross- correlation or mutual information
- rigid or elastic
- align an image onto an "atlas" (reference image)
  => use for segmentation



CT



MRI

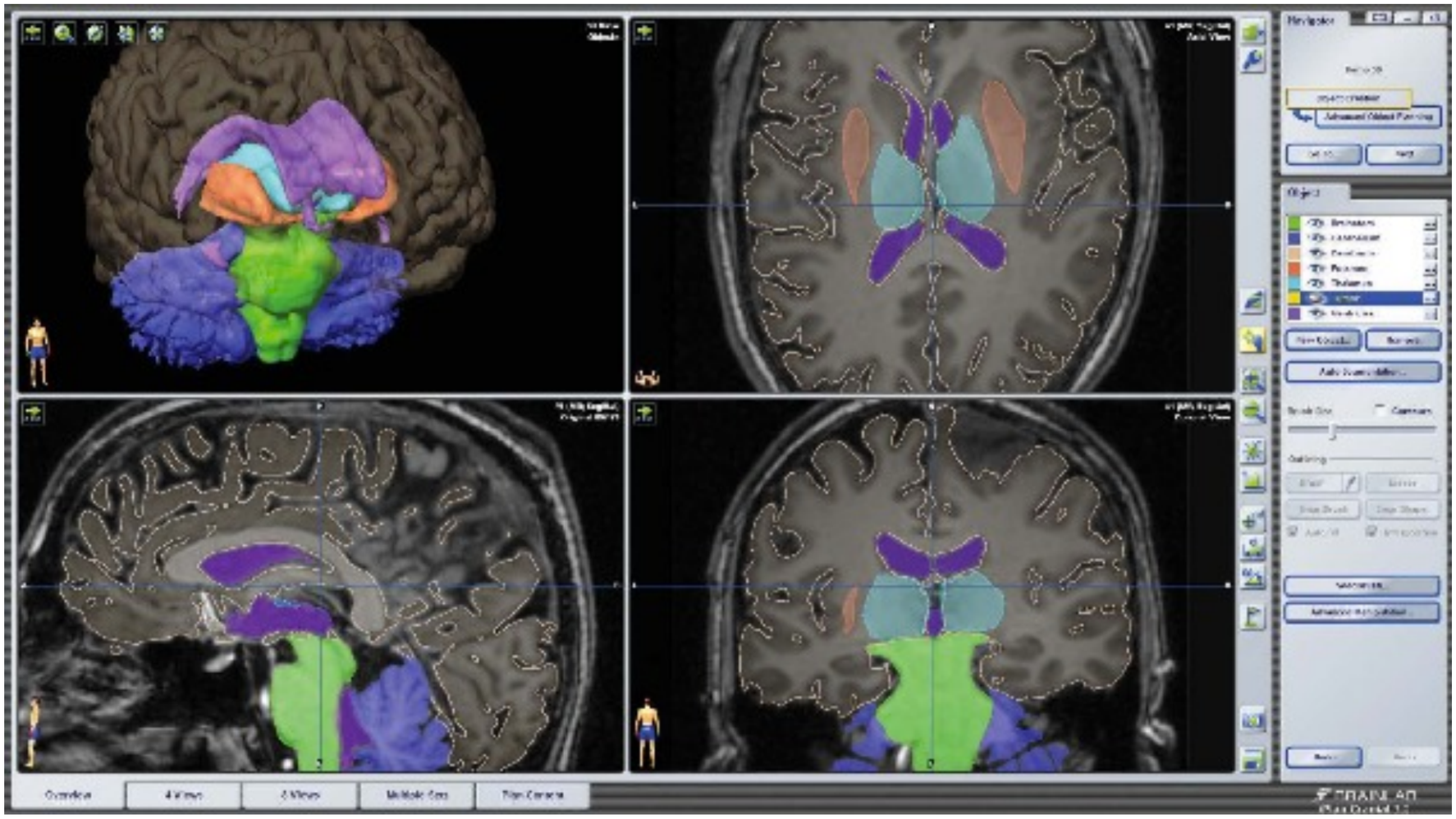


fused image

What do I do for Brainlab?

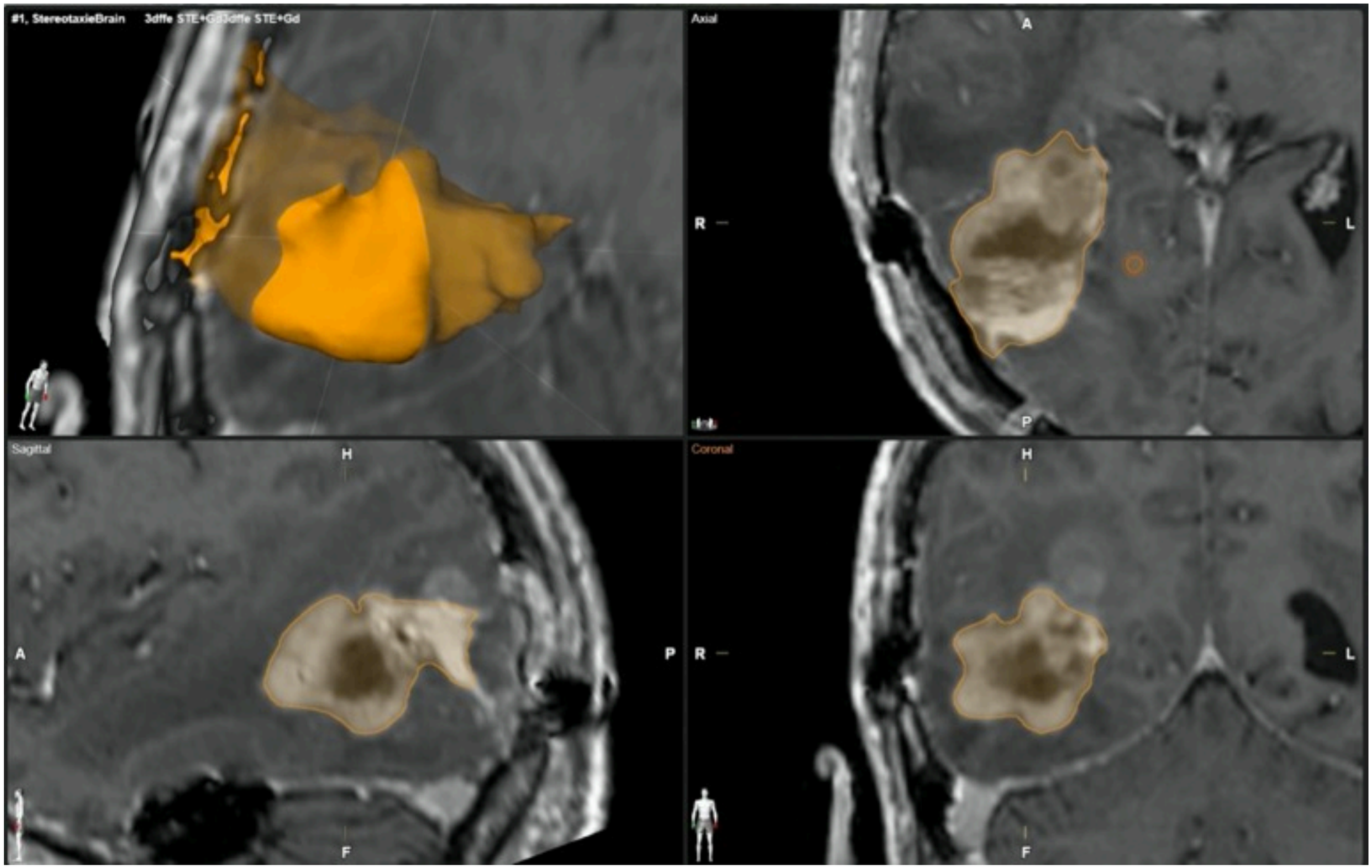
Image segmentation: separate the brain image into its components (gray/white matter, brainstem, ventricles, ...)

- fuse the image with a reference dataset ("atlas"), in which we have identified the different parts
- run an EM-algorithm that identifies the brain regions according to their gray values
- use edge detections etc
- ...



What do I do for Brainlab?

Semi-automatic tools for outlining tumors:



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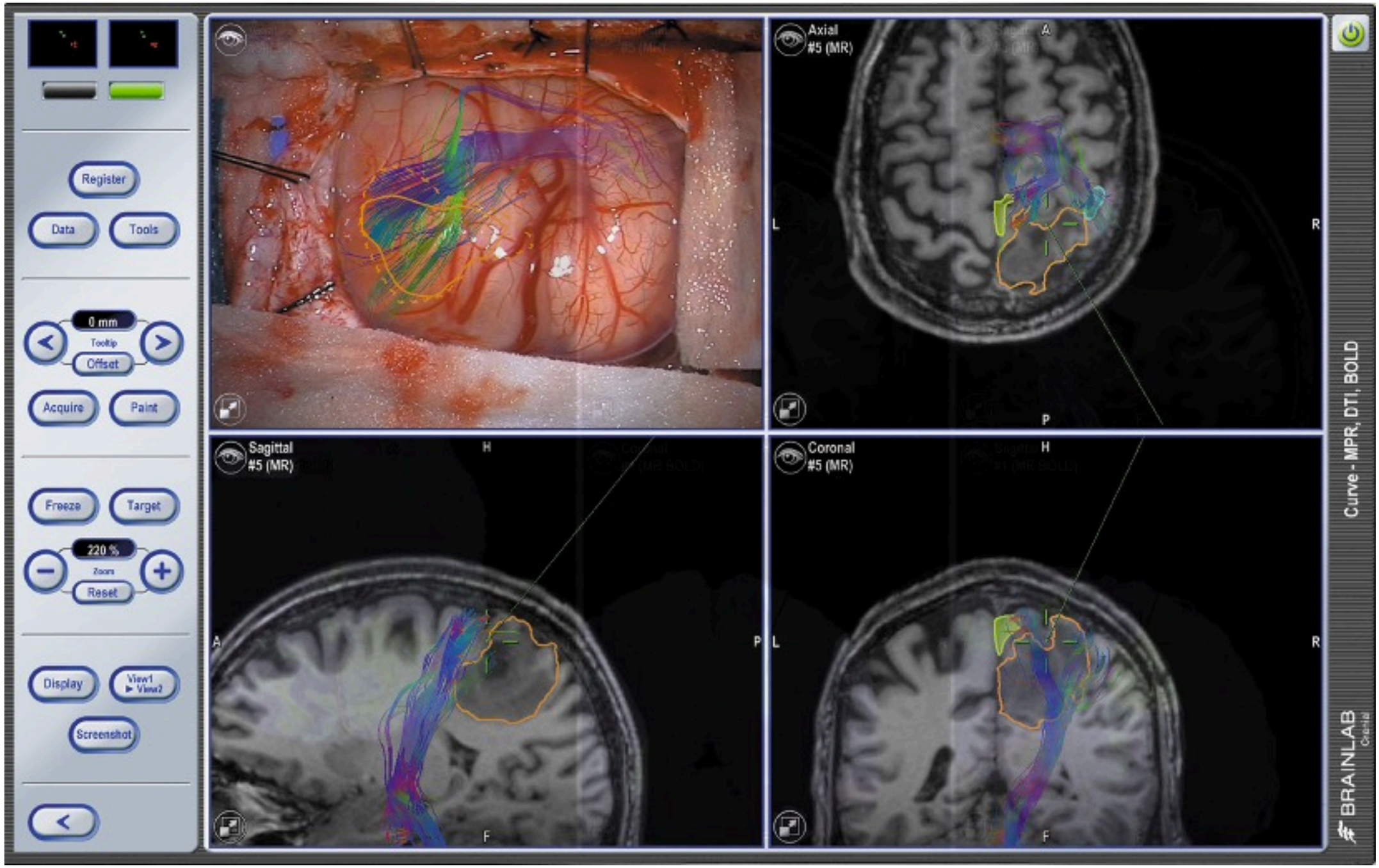
Fiber tracking:



A typical day

- get to work (in Feldkirchen => pain in the ass to get there!) around 8:30 (!)
- have coffee with my team members, discuss the weekend, work related problems and ideas, and bitch about other colleagues
- program the whole morning, discuss about problems with my team members
- have lunch at the Brainlab-restaurant
- program the whole afternoon, have a coffee break
- go home around 5:30

- Sometimes we get cool talks about how the brain works, brain anatomy courses etc :)

More info

www.brainlab.com

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