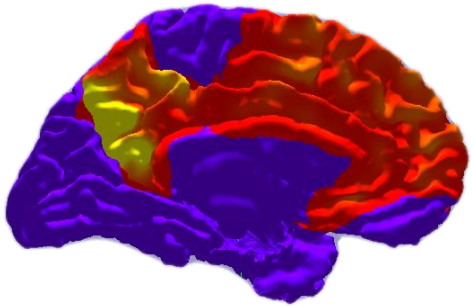
CTU
CZECH TECHNICAL UNIVERSITY IN PRAGUE

# Brain Lab Introduction

Lab Leader: Ing. Milan Němý, Ph.D.
Department of Cognitive Systems and Neurosciences
CIIRC CTU

October 20, 2026

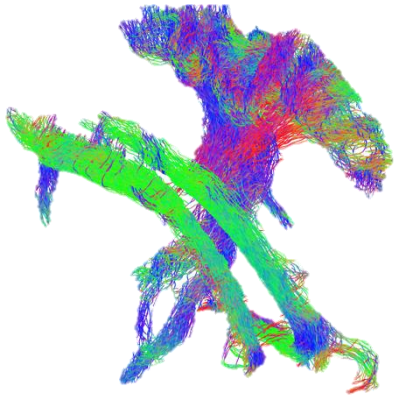
# Brain Lab at CIIRC






## White Matter Systems

- WM tractography
- Cortical projection mappings
- White matter abnormalities
- Resting-state function MRI
- Deep learning tractography



## Glioma Microstructure Characterization

- Diffusion signal modelling
- Automated segmentation
- Genetics prediction
- Data transfer infrastructure







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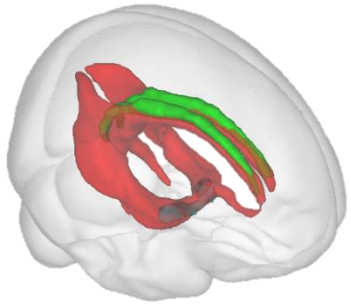
The research was supported by Czech Science Foundation Grant No. 25-18359M

Clara

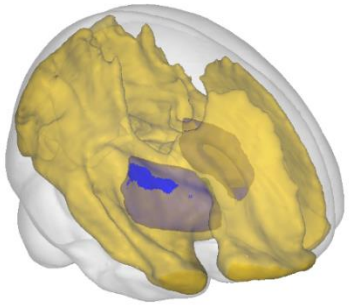
Center for Artificial Intelligence and Quantum Computing in System Brain Research.
Funded by the European Union
Co-funded by the European Union
MINISTRY OF EDUCATION, YOUTH AND SPORTS

AZV ČR AGENTURA PRO ZDRAVOTNICKÝ VÝZKUM ČESKÉ REPUBLIKY

# Brain White Matter Pathways

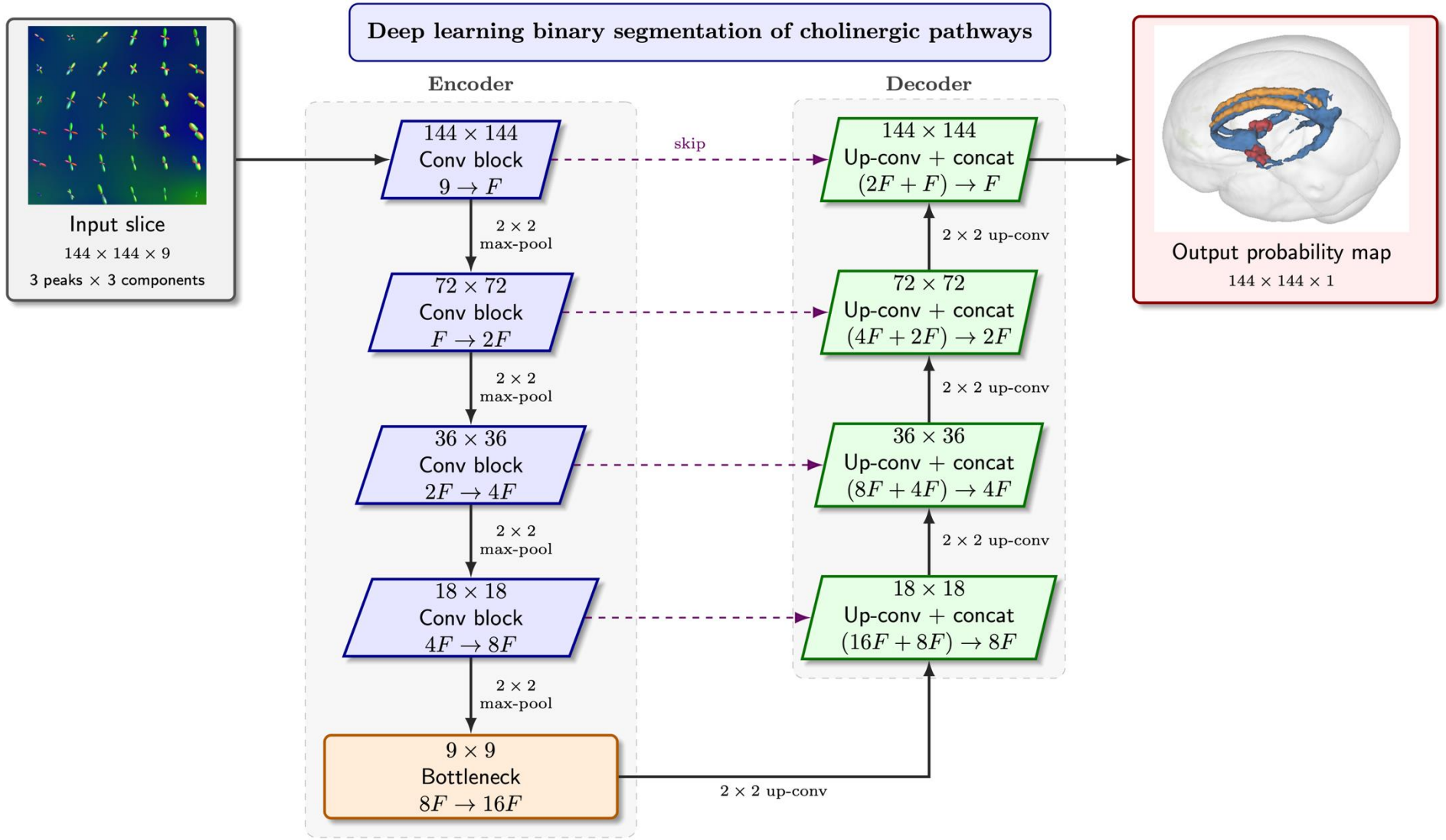


Through cingulum



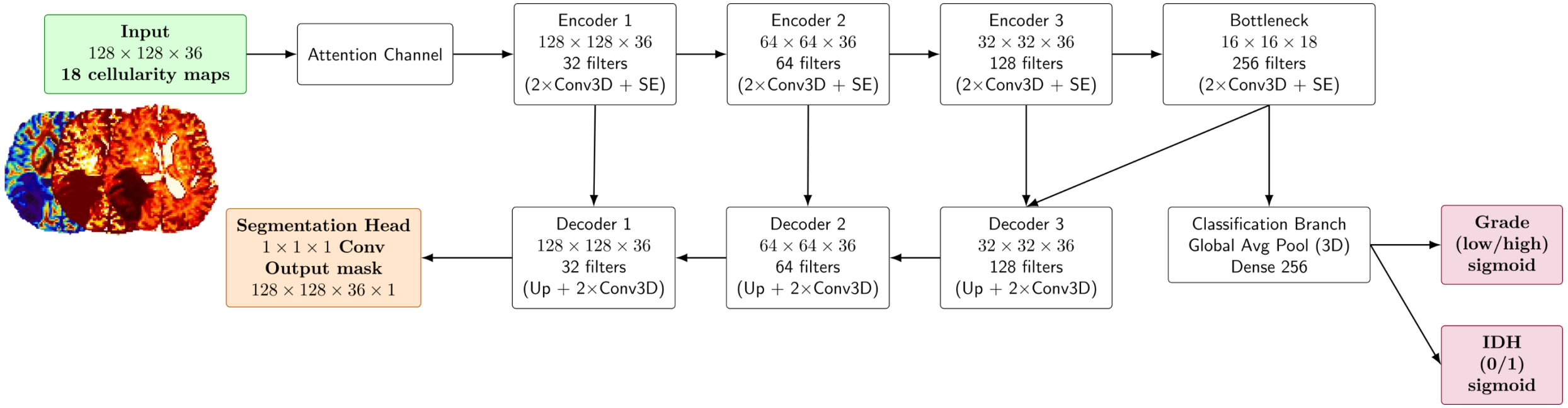
Through external capsule

(Nemy et al., 2020)



# Our AI Model for Glioma Analysis

Diffusion-derived feature maps → neural network → tumour outline, grade group and IDH status



# Student Projects

https://beat.ciirc.cvut.cz/student-projects/

- **Classical Neuroimaging**
  - Automated Brain Extraction
  - Diffusion Tensor Tractography in Alzheimer‘s Disease
  - Voxel-based Cortical Thickness Measurements in MRI
- **Deep Learning-Driven Neuroimaging**
  - DL-Driven Automated Lesion Segmentation in MRI in Multiple Sclerosis
  - Glioma Characterization using Advanced DWI Methods
  - Deep Learning-based Tractography
  - Deep Learning-based Image Denoising
- **Quantum Computing**
  - Quantum Optimization (brain networks, graph theory, etc.)
  - Quantum classicifation (e.g., quantum SVM)