

# Zhaoyu Deng

Molecular Imaging Center, The Fifth Affiliated Hospital, Sun Yat-sen University, China

✉ [zhaoyu\\_deng@163.com](mailto:zhaoyu_deng@163.com) | [github.com/ZhaoyuDeng](https://github.com/ZhaoyuDeng) | [Google Scholar](#)

## Education

### Institute of Psychology, Chinese Academy of Sciences

Beijing, China

M.Sc. in Functional Neuroimaging, Cognitive Neuroscience

Sep. 2020 - Jul. 2023

- **Advisor:** Chao-Gan Yan ( [R-fMRI Lab](#) ) ( [Google Scholar](#) ) Professor, Tsinghua University
- **Graduation Thesis:** The Fusion of Structural and Functional Connectivity and its Application in Autism
- **GPA:** 3.47/4
- **Courses:** R-fMRI, Functional Neuroanatomy, EEG, Neuropathophysiology, Computational Neuroscience, Machine Learning, Deep Learning.

### Hunan Normal University

Changsha, China

B.Eng. in Electronic Information Science and Technology

Sep. 2016 - Jul. 2020

- **Courses:** Linear Algebra, Signaling and Systems, Analog and Digital Signal Processing, Automatic Control, C, Python, Java, MATLAB.

### Hunan Normal University

Changsha, China

B.Sc. in Applied Psychology (Minor Degree)

Sep. 2017 - Jul. 2019

- **Courses:** Psychological Statistics, Experimental Psychology, Psychological Research Methods, Clinical Psychology, Psychiatry, SPSS.

## Employment

### Molecular Imaging Center, The Fifth Affiliated Hospital, Sun Yat-sen University

Zhuhai, China

Lab Technician

Dec. 2023 - Now

- **Supervisor:** Yi He ( [He Lab](#) ) ( [Google Scholar](#) ) Principal Investigator, NMED, SIAT, Chinese Academy of Sciences
- Operate and maintain Bruker 9.4T MRI, prepare small animals for experiment, e.g. mouse and rat. ( [Bruker BioSpec 94/30 USR](#) )
- Conduct small animal imaging scans, e.g. T2w, rsfMRI, DTI, QSM.
- Analyze derived small animal 9.4T data and clinical patient 3T data, e.g. rsfMRI analysis, DTI TBSS.
- Capability to perform perfusion and brain removal surgery and tail vein remote micro-injection during MRI scanning.
- Operate and maintain public Linux server in laboratory.

### School of Biomedical Engineering, Tsinghua Medicine, Tsinghua University

Beijing, China

Part-time Research Assistant

Jul. 2023 - Nov. 2023

- **Supervisor:** Qiyan Tian ( [BIRTH Lab](#) ) ( [Google Scholar](#) ) Principle Investigator and Assistant Professor, Tsinghua University
- Analyze diffusion MRI data of conspiracy subjects using DTI, DKI and NODDI.
- Mainly responsible for organizing, preprocessing including distortion correction, diffusion tensor model fitting, Tract-Based Spatial Statistics (TBSS), and writing methods on paper.
- **Skills:** MATLAB, Bash, FSL, Linux

## Publication

- [1] Liang, M., Yuan, J., Gu, T., **Deng, Z.Y.**, Tang, Y., Li Y., He Y. (2024). In vivo tensor-valued diffusion MRI evaluates isotropic and anisotropic kurtosis mismatch in a middle cerebral artery occlusion stroke model. ( Under Review )
- [2] Yan, C.G., Wang, X.D., Lu, B., **Deng, Z.Y.**, Gao, Q.L. (2024). DPABINet: A toolbox for brain network and graph theoretical analyses. Science Bulletin, 69(11), 1628–1631. (DOI)
- [3] Yu, A.H., Gao, Q.L., **Deng, Z.Y.**, Dang, Y., Yan, C.G., Chen, Z.Z., Li, F., Zhao, S.Y., Liu, Y., Bo, Q.J. (2023). Common and unique alterations of functional connectivity in major depressive disorder and bipolar disorder. Bipolar disorders. (DOI)
- [4] Qin, J., Zeng, Z., Sun, L., **Deng, Z.Y.** (2018). Discussion on the Erection of Large Data Platform Based on Hadoop. Modern Industrial Economy and Informationization, 8(5), 47-49. (DOI)

## Research Experience

### Projects involved in He Lab

Zhuhai, China

Lab Technician, Team Member

Dec. 2023 - June.2024

- Analyze combining immunohistochemistry section and in-vivo MRI images from the same stroke mouse brain.
- Analyze Peak width of Skeletonized Mean Diffusivity ( PSMD ) and IntraVoxel Incoherent Motion ( IVIM ) in CSVD mouse.
- Analyze in-vivo myocardial infarction diffusion MRI data, partition infarction according to Propagation Angle (PA).
- Independent Component Analysis ( ICA ) using mouse Line Scan (DIANA) data.
- White matter Tract-Based Spatial Statistics ( TBSS ) in Autism mouse.
- Cooperate with clinical doctor, analyze CSVD patients' data, including functional connectivity network and NODDI.
- Program laser illuminator, pulse stimulator, and scientific camera for neurophysiological experiments.
- **Skills:** Bash, MATLAB, Python, AFNI, FSL, MRtrix, DIPY, Linux

## The Fusion of Structural and Functional Connectivity and its Application in Autism

Beijing, China

First Author, Graduation Thesis

Jun. 2022 - Jul. 2023

- Find out new biomarkers in high-function autism data using single-modal methods like Tract-Based Spatial Statistics (TBSS), Functional Connectivity and Structural Connectivity, and multi-modal methods like Track-weighted Functional Connectivity (TW-FC) and Structure-Function Coupling. (188 subjects)
- Discover relationship between new features and Autism severity. Discover the diagnosis accuracy improvement of multimodal methods by using Support Vector Machine (SVM).
- Skills:** MATLAB, Linux, Docker, QSIprep, MRtrix, FSL

## DPABIFiber: A Fiber Tractography and Structural Connectivity Analysis Toolbox

Beijing, China

Participant, Part of Graduation Thesis ( [DPABIFiber](#) )

Mar. 2022 - Jan. 2023

- DPABIFiber is a fiber tractography analysis toolbox based on diffusion-weighted imaging (DWI), evolved from and as easy-to-use as DPABI/DPABISurf/DPABINet/DPARSF. DPABIFiber is based on QSIprep, MRtrix3, AFQ, fMRIPrep, FreeSurfer, ANTs, FSL, SPM12, dcm2niix, PALM, GNU Parallel, MATLAB, Docker and DPABI.
- DPABIFiber provides a user-friendly graphical user interface (GUI) for pipeline DWI preprocessing, fiber tractography reconstruction, tract-based spatial statistics (TBSS), automating fiber-tract quantification (AFQ), structural connectome matrix analyses, seed-based structural connectivity analyses, and tract-weighted functional connectivity (TW-FC), while requires no programming/scripting skills from the users.
- Skills:** MATLAB, Linux, Docker, QSIprep, MRtrix, FSL, FreeSurfer

## Functional Connectivity Changes in Two Cortico-hippocampal Networks in the Continuum of Alzheimer's Disease

Beijing, China

Joint First Author, Cooperation with Xuanwu Hospital

Jan. 2022 - Jul. 2023

- Identifying whether functional connectivity within the AT (anterior-temporal) and PM (posterior-medial) systems would be altered in individuals with subjective cognitive decline; whether the magnitude of functional connectivity changes has a ladder effect in the continuum of Alzheimer's disease; assessing the function of the AT and PM systems using correlational analyses between cognitive performance and intrinsic connectivity.
- Involved in this project by analysing resting-state fMRI data on server. (approximately 1000 subjects)
- Skills:** MATLAB, DPABI, Linux

## Common and Unique Alterations of Functional Connectivity in Major Depressive Disorder and Bipolar Disorder

Beijing, China

Third Author, Cooperation with Beijing Anding Hospital

Mar. 2022 - Apr. 2023

- Major depressive disorder (MDD) and bipolar disorder (BD) are considered whole-brain disorders with some common clinical and neurobiological features. It is important to investigate neural mechanisms to distinguish between the two disorders. However, few studies have explored the functional dysconnectivity between the two disorders from the whole brain level.
- Our findings indicated that both MDD and BD are extensive abnormal brain network diseases, mainly aberrant in those brain networks correlated to the processing of external stimuli, especially the attention network. Specific altered functional connectivity also was found in MDD and BD groups respectively. These results may provide possible trait markers to distinguish the two disorders. (284 subjects)
- Skills:** MATLAB, Linux, Docker, R-fMRI, Network Analysis

## Mind Flower Project

Beijing, China

Member, Experimenter

Jul. 2021 - Jul. 2023

- The Mind Flower Project is a decade-long depression follow-up study led by Prof. Chao-Gan Yan, which aims to establish an objective marker of accurate diagnosis and classification of depression using a variety of research methods such as brain imaging, explore new psychological intervention techniques based on Chinese culture, and develop new non-invasive neuromodulation therapies other than drugs.
- I am participating in the design of project and experiments, manage MRI, behavioral task, oral report record, wristband and brain ring data, have held more than 10 times MRI experiments.
- I developed an electronic edition of Framed-line Test (Kitayama et al., 2003) with Python to test the capability of incorporating/ignoring contextual information.
- Skills:** MATLAB, Python, E-Prime

## Skills

<b>Programming</b>	Python, MATLAB, Bash, C, R, Java, SQL, HTML
<b>IT</b>	Linux, Git, Docker, TeX, Embedded Programming, Signal Processing, Machine Learning
<b>Neuroimage</b>	FSL, AFNI, SPM, ANTs, MRtrix, DIPY, DPABI, etc.
<b>Interests</b>	Badminton, Photography, Bicycle
<b>Language</b>	English (IELTS 6.5), Chinese (Native), Cantonese (Native)

## Awards

2021	<b>Merit Student</b> , University of Chinese Academy of Sciences	Beijing, China
2020	<b>Academic Scholarship</b> , University of Chinese Academy of Sciences	Beijing, China
2019	<b>Merit Student, First Award</b> , Hunan Normal University	Changsha, China
2018	<b>Bronze Award</b> , China College Students' Entrepreneurship Competition	Changsha, China
2018	<b>Second Award</b> , Hunan College Student Internet of Things Innovation Design Competition	Changsha, China
2018	<b>Second Award</b> , Hunan College Student Electronic Design Competition, Preliminary Round	Changsha, China