

# Laminar fMRI Short Course 2023

October 02 – 05, 2023 (mon – thu)

**Goal:** to provide training to enable learners to perform Laminar fMRI in their research

**Audience:** trainees and other researchers with some prior experience in fMRI

**Presenters/Faculty:** practitioners who have experience with Laminar fMRI in their own research

**Format:** didactic and educational talks (\*remote presentation)

**Daily schedule:** morning 9:00 AM - 12:30 | lunch 12:30 - 1:30 | afternoon 1:30 - 5:00 PM

**Networking:** informal interactions with faculty – mon: dinner | mon-wed: 5:00-6:00 PM | coffee breaks

## Day 1 (Oct 2, 2023)

### Topic I: Introduction to laminar fMRI

#### morning

9:00 AM	Welcome and General Introduction	Robert Savoy
9:15 AM	Program Overview	Jon Polimeni
9:30 AM	Theory: What Neuroscience Insights can Layer-Specific Activity Provide?	Joziën Goense
10:30 AM	What is a cortical layer? Cyto-, Myelo-, Angio- and Functional Architecture	Jon Polimeni
11:00 AM	Break	
11:30 AM	Applications of Laminar fMRI: History, Key Applications, and Lessons Learned	David Norris*
12:30 PM	Lunch	

### Topic II: Basic Data Acquisition

#### afternoon

1:30 PM	Basic Laminar fMRI Acquisition Toolkit (Functional and Anatomical Pulse Sequences)	Saskia Bollmann
2:15 PM	High-Resolution Functional protocol optimization and data acquisition	Renzo Huber
3:00 PM	Break	
3:30 PM	7T Acquisition Walk-Through: Practicalities, Calibrations, and Adjustments	Renzo Huber
4:30 PM	High-Resolution Anatomical (and Vascular) Data Acquisition	Saskia Bollman
5:00 PM	End and meet the faculty	
6:30 PM	course dinner, faculty and learners (Night Shift Brewing, 1 Lovejoy Wharf #101, Boston, MA 02114)	

## Day 2 (Oct 3, 2023)

### Topic III: Data Preprocessing and Analysis

#### morning

9:00 AM	Review and Q&A	Jon Polimeni
9:15 AM	Laminar fMRI Data Analysis Overview	A. Tyler Morgan
9:30 AM	Cortical Segmentation I: Whole-brain and automatic methods	Daniel Gomez
10:00 AM	Cortical Segmentation II: Partial-brain methods and quality control	Faruk Gulban
11:00 AM	Break	
11:30 AM	Accurate Functional-Structural Registration, Alignment, and Validation	Doug Greve
12:30 PM	Lunch	

#### afternoon

1:30 PM	EPI Distortion Correction	Divya Varadarajan
1:45 PM	High-Resolution fMRI Data Preprocessing	Jon Polimeni
2:15 PM	Denosing: getting past the thermal noise barrier using NORDIC.	Luca Vizioli
3:15 PM	Break	
3:45 PM	Physiological Noise across layers	Jingyuan Chen
4:00 PM	Cortical Partial Volume Correction and “Spatial GLM” for Resolving Layers	Doug Greve
5:00 PM	End and meet the faculty	

## Day 3 (Oct 4, 2023)

### Topic IV: Interpretation and Modeling

#### morning

9:00 AM	Review and Q&A	Jon Polimeni
9:15 AM	Principles and Algorithms: Into The Depths of Layers, Layerification, And Laminar Hypothesis Testing	Faruk Gulban
10:30 AM	Visualization: Laminar Profiles, Informed Smoothing, and Cortical “Flattening”	Anna Blazejewska
11:00 AM	Break	
11:30 AM	Hands-on I: From EPI activation to layer-profiles in LayNii	Renzo Huber
12:30 PM	Lunch	

#### afternoon

1:30 PM	Hands-on II: “When I tried it, it didn’t look as nice as on your slides”	Renzo Huber
2:30 PM	Break	
3:00 PM	Laminar Functional Connectivity	Jingyuan Chen
3:30 PM	Interpreting Cortical Depth-Dependent fMRI Signals: Biophysical Models and Inversion	Kamil Uludag
4:30 PM	How to Publish Your Laminar fMRI Study: What do Reviewers Want to See?	Jon Polimeni & Renzo Huber
5:00 PM	End and meet the faculty	

## Day 4 (Oct 5, 2023)

### Topic V: Advanced Applications and Future Directions

#### morning

9:00 AM	Review and Q&A
9:15 AM	Neuronal Specificity of Hemodynamics and Neurovascular Coupling: What is Known?
10:00 AM	Advanced Analyses and Computational Modeling in layer-fMRI
10:45 AM	Break
11:15 AM	Future Directions: Will Laminar fMRI Change Human Neuroscience?
12:15 PM	Lunch

Jon Polimeni  
Anna Devor  
Luca Vizioli

Peter Bandettini

#### afternoon

1:15 PM	General Discussion; Additional Resources; Class Review and Feedback
2:30 PM	End

Jon Polimeni & Renzo Huber