

Multimodal analysis and inverse problems for brain imaging

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In this presentation, I will present the coupling of two brain imaging modalities: electroencephalography (EEG) and diffuse optical tomography (DOT). In the first part, I will introduce a model for generating synthetic coupled data based on neurovascular coupling. Through dimensional analysis, we will validate an EEG model that incorporates time-dependent sources of electrical brain activity, alongside a time-harmonic DOT model with time-varying optical parameters of the brain. We will simulate synthetic EEG and DOT data derived from the same brain activity on a realistic 3D head model. In the second part, I will investigate two inverse problems: source localization in EEG and parameter identification in DOT. I will provide theoretical and numerical results.

This is a joint work with Stephanie Lohrengel and Benjamin Sulis, LMR URCA, Reims.