

Multi-dimensional third-order statistical method to analyze cross-frequency coupling in EEG/MEG

Monday, September 23, 2024 11:00 AM (20 minutes)

In this presentation, I will begin by discussing the established methods for conducting cross-frequency analysis in functional neuroimaging. Following this, I will introduce a novel statistical approach known as Multi-dimensional Antisymmetric Cross-Bicoherence (MACB, [1]). Grounded in bispectral analysis, MACB aims to identify quadratic lagged phase-interactions among vector time series within the frequency domain, with particular relevance to electro/magnetoencephalographic signals. One significant advantage of MACB is its invariance under the choice of physical coordinate system in neuro-electromagnetic inverse procedures. Additionally, MACB addresses the challenge of information loss associated with dimensionality reduction analysis, a requirement in other standard approaches. Through extensive synthetic experiments, I will demonstrate MACB's superior performance compared to alternative metrics, particularly evident when dealing with shorter data lengths or higher dimensions of single data spaces. In conclusion, this talk will explore the potential of using the introduced multi-dimensional third-order statistical method to enhance the understanding of neural cross-frequency phase couplings.

[1] Basti, A., Nolte, G., Guidotti, R., Ilmoniemi, R. J., Romani, G. L., Pizzella, V., & Marzetti, L. (2024). A bicoherence approach to analyze multi-dimensional cross-frequency coupling in EEG/MEG data. *Scientific Reports*, 14(1), 8461.

If you're submitting a poster, would you be interested in giving a blitz talk?

No

If you're submitting a symposium talk, what's the symposium title?

Beyond Neural Connectivity: Exploring Higher Order Interactions in the Brain

If you're submitting a symposium, or a talk that is part of a symposium, is this a junior symposium?

No

Primary author: BASTI, Alessio

Presenter: BASTI, Alessio

Session Classification: Symposia