

# Music interactions and advanced statistical models

## IPEM Symposium & PhD defense

DATE: **5th July 2024**

VENUE: **zaal De Blauwe Vogel - De Krook**, Miriam Makebaplein 1, 9000 Gent

@EVENT: **register at** <https://tinyurl.com/SYMPMUSINT> to receive the link!\*

\*Certificates of attendance will be issued on request

**STARTS AT 11:00H CET**

### Talk

Understanding how musical entrainment facilitates self-augmentation

**Marc LEMAN**  
GHENT UNIVERSITY

### Talk

Stimulating emotional motor control with music feedback

**Tom H. FRITZ**  
MAX PLANCK INSTITUTE FOR COGNITIVE AND BRAIN SCIENCES

### Talk

Beta and gamma-band neuromagnetic oscillations of the sensorimotor systems: predictive timing, action representation, and plasticity

**Takako FUJIOKA**  
STANFORD UNIVERSITY

**STARTS AT 13:00H CET**

### Talk

Modelling physical activity profiles in COPD patients: a fully functional approach to variable domain functional regression models

**María DURBÁN**  
UNIVERSITY CARLOS III

### Talk

Statistical learning with categorical functional data

**Cristian PREDÁ**  
LILLE UNIVERSITY

### Talk

Higher-order behaviors in complex systems: insights from information decomposition

**Daniele MARINAZZO**  
GHENT UNIVERSITY

**STARTS AT 16:00H CET**

## PhD defense

### Hilbertian statistical models in music neuroscience

My PhD has revolved around music interactions, neuroscience and mathematical statistics. I developed neuroscientific models to infer the activity of neuromodulatory systems using non-invasive neurophysiological monitoring techniques, aiming to reveal the effects of motor intention and execution, and their related neural substrate during musical interactions. New methodologies for Independent Component Analysis in an infinite-dimensional framework were formulated to allow for an investigation of this topic. Together with my supervisors and collaborators, we demonstrated that motor action induces functional changes in the brain that influence how we perceive and respond to music. Embodiment processes seem to correspond to complex interactions with low-frequency modulatory activity, ultimately affecting degree of emotionality. We also showed data suggesting that the brain, during these states of increased emotionality, is poised at a critical state and that diffusion over the cortical field is more turbulent, potentially facilitating information flow through subsequent turbulence down-scaling. Overall, the statistical methods we developed provide a robust foundation for a more in-depth understanding of the fascinating field of embodied music neuroscience.

**Marc VIDAL**

GHENT UNIVERSITY  
UNIVERSITY OF GRANADA  
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**Supervisors:** Ana M. AGUILERA (University of Granada) & Marc LEMAN (Ghent University)

**Co-supervisor:** Tom H. FRITZ (Max Planck Institute)

**Chair:** Maximiliaan Martens

**Jury members:** María Durbán, Takako Fujioka, Daniele Marinazzo, Vadim Nikulin, Cristian Preda, M<sup>o</sup> Dolores Ruiz-Medina

**Rapporteur:** Bart Moens

