



“Neural Mechanisms Enabling Resting-State Brain Networks: Evidence from Time-Resolved Brain Imaging”

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Abstract: During the past decade, resting-state networks have been identified in the human brain with fMRI and more recently, MEG. These findings indicate that broad motifs of correlated brain activity engage cerebral regions from distinct functional systems, even during prolonged, and non task-specific resting periods. Yet, the neurophysiological mechanisms explaining the production of these organized fluctuations remain to be uncovered. In this talk, we will review with MEG source imaging how the nested dynamics of neural oscillations provide a support for long-range, default connectivity in the resting brain. In particular, we will report observations that the occurrences of local high-frequency neural oscillations are coupled with the phase of slower fluctuations and demonstrate that it is a ubiquitous phenomenon across the human brain. We propose and demonstrate that this nesting mechanism of phase-amplitude coupling between neural oscillations accounts for the correlated variations of imaging signals from different brain regions that have been observed using other techniques in the resting brain so far. We will also show examples from neuro-feedback applications of MEG source imaging, whereby subjects are presented in real-time, with reports on the ongoing activity in targeted brain regions.

Biography: Sylvain Baillet graduated from the Department of Applied Physics at the Ecole Normale Supérieure de Cachan (France) and completed his Ph.D. training in Physics at the University of Paris: Orsay, in 1998. He was with the University of Southern California until 2000, before joining the Centre National de la Recherche Scientifique (CNRS, France) as a tenured Research Scientist. He became the head of the Brain Imaging group at the Cognitive Neuroscience and Brain Imaging CNRS Laboratory in 2005, at the Hôpital de La Salpêtrière in Paris. In 2008, he took a position as Associate Professor of Neurology & Biophysics at the Medical of Wisconsin and became the founding Scientific Director of the MEG Program at Froedtert Hospital, in Milwaukee (USA). In 2011, he joined the Montreal Neurological Institute at McGill University as an Associate Professor of Neurology and Neurosurgery and as the founding Director of Research of the MNI's newly established MEG Program. Overall, he has co-authored about 60 articles and book chapters and 120 communications in international conferences. He is also co-inventor of 3 international patents.

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