

Interaction Mechanisms in Biomedicine

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Interacting dynamical systems abound in nature and often the interest is not only to understand if, but also how they interact i.e. to reveal the functions and mechanisms that define and connect them. Coupling functions contain detailed information about the functional mechanisms underlying the interactions and prescribe the physical rule specifying how an interaction occurs [1]. Using a method based on dynamical Bayesian inference [2], we show how one can reconstruct and assess the coupling functions from phase dynamics of oscillatory data. Then, we present number of recent applications in biomedicine – including the cardio-respiratory coupling functions [2], neural cross-frequency coupling functions in eyes open/eyes closed resting state [3], and the state of general anaesthesia with two anaesthetics (propofol and sevoflurane) [4]; as we also present bursting neuronal coupling functions from multielectrode array (MEA) recordings of interacting neurons from rats.

[1] Stankovski et al., *Rev. Mod. Phys.*, (2017)

[2] Stankovski et al., *Phys. Rev. Lett.* (2012)

[3] Stankovski et al., *Front. Syst. Neurosci.* (2017)

[4] Stankovski et al., *Philos. Trans. Royal Soc. A* (2016)