Karl Friston is a theoretical neuroscientist and authority on brain imaging. He invented statistical parametric mapping (SPM), voxel-based morphometry (VBM) and dynamic causal modelling (DCM). These contributions were motivated by schizophrenia research and theoretical studies of value-learning – formulated as the dysconnection hypothesis of schizophrenia. Mathematical contributions include variational Laplacian procedures and generalized filtering for hierarchical Bayesian model inversion. Friston currently works on models of functional integration in the human brain and the principles that underlie neuronal interactions. His main contribution to theoretical neurobiology is a free-energy principle for action and perception (active inference).

Abstract:
This talk considers formal or computational approaches to psychopathology. I will use psychosis as a case study in computational psychiatry. We first review the basic phenomenology and pathophysiological theories of schizophrenia, with a special focus on synaptopathy and neuromodulation. These motivate the choice of a formal or computational framework within which to understand psychopathology; particularly, in terms of false beliefs or inference. This framework is the Bayesian brain. We will focus on the (neuromodulatory) encoding of uncertainty or precision within predictive coding implementations of active inference – to demonstrate computational approaches to pathogenesis in neuropsychiatric disorders. The endpoint of this analysis is the key role of neuromodulation in selecting those aspects of the sensorium that underwrite our belief updating – and making sense of our lived world.

Learning Objectives:
1. Describe early taxonomies of dysconnection in terms of synaptopathy.
2. Analyze hallucinations and delusions in terms of predictive processing and active inference.
3. Discuss key role of neuromodulatory synaptopathy in underwriting hallucinations and delusions.

References:

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