

## **Title: Neural Information Encoding by Point Process Adaptive Filtering**

**Abstract:** The study of animal and human brains has undergone a revolution in the last decade or so. Numerous modalities have developed or advanced to allow human and animal brains to be studied dynamically on a number of temporal and spatial scales. In this talk we discuss one such modality namely multi-electrode recordings of awake animals. We review the remarkable phenomenon of place fields in which an animal (a rat in our case) forms a physical representation of its location in its hippocampus (a small brain structure associated with learning). We then describe nonlinear tracking methods (point process based adaptive filters) that allow the formation of these fields (i.e. the learning process) to be followed in real time from spike train recordings taken directly from CA1, a structure in the hippocampus. For the mathematically inclined we present some new related results on stochastic averaging of adaptive algorithms.