Contribution Title:	THE PHYSICS OF DECISION MAKING: STOCHASTIC DIFFERENTIAL EQUATIONS AS MODELS FOR NEURAL DYNAMICS AND EVIDENCE ACCUMULATION IN CORTICAL CIRCUITS
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Invited speaker:	Plenary
YRS seminar:	NO

I will describe how drift-diffusion processes – systems familiar in physics – can be used to describe evidence accumulation and decision-making in two-alternative, forced choice tasks. These stochastic differential equations can be derived from biophysically-detailed models of spiking neurons, and as continuum limits of the sequential probability ratio test (SPRT). Drawing on SPRT theory, they can also be shown to be optimal in the sense that they deliver decisions of specified accuracy in the shortest possible time, or the most accurate decisions possible in a pre-specified time. This leaves open the critical balance of accuracy and speed. In the first part of the talk I derive an optimal speed-accuracy tradeoff for a very simple perceptual decision task, compare human performance with this benchmark, and discuss possible reasons for prevalent sub-optimality. In the second part I address the incorporation of prior information such as the expectation of rewards, knowledge of more probable alternatives, and feedback from other decision makers.