

LENS/CMP Seminar

April 17, 2020

Speaker: John Beggs, Indiana University Department of Physics

Title: **“Condensed Gray Matter: Is the cortex dynamics really critical?”**

Abstract: Research over the past 15 years has shown that the brain’s cortex operates near a continuous phase transition, poised between a phase where activity cascades, or neuronal avalanches, are amplified and a phase where they are damped. It is natural to assume that near a critical point many information processing functions, like information transmission, information storage and computational power, are optimized. A more “critical” analysis of experimental data seems to indicate a departure from this paradigm. Rather than displaying a single universality class with a set of critical exponents expected for that class, it seems the exponents of the cortex vary over time/species/conditions, while still holding an approximate scaling relation. These observations call for a new organizing principle in the brain, unlike what has previously been speculated. Here I will describe this new organizing principle, dubbed **Quasicriticality**, and explain how it accounts for the wide set of exponents observed in experiments. I will also briefly describe some testable predictions that could be falsified experimentally soon.

Work done with Gerardo Ortiz, Rashid Williams-Garcia and Leandro Fosque.