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Potts Model with Different Spin States, Simulated on a Structural Connectome to Model the Structure- Function Relationship of the Human Brain[1] PUBUDITHA ABEYASINGHE, Western University, FRANCISCO DE SOUSA LIMA, Universidade Federal do Piau, MARCO AIELLO, CARLO CAVALIERE, NAPLAB, RAIMUNDO COSTA, Federal University of Ceara, ADRIAN OWEN, ANDREA SODDU, Western University — High complexity of the brain is strongly limiting our understanding of the mechanisms that dominate its functionality. It is believed that the spatial functional patterns could be at least partially understood by looking at the distribution of axonal fibers This was investigated by simulating models like the 2-dimensional (2D) classical Ising model on a structural connectome. 2D Ising model consists of two state spins and the Potts model is a generalized classical Ising model where we can explore the effect of spins with different number of states without limiting to two In this work, we have simulated the Potts model on a structural connectome with different number of spin states. Results from the model were compared with the empirical functional data to find an instant of the model that gives the best match. 2 states Potts model resulted in similar results to that of the Ising model. Additionally, thermodynamic properties such as the magnetic susceptibility, illustrated a phase transition from at the critical temperature for all cases. However, further analysis shows that a Potts model with 3 or 4 states spins not necessarily provide more information about the spontaneous function of the brain compared to the 2D classical Ising model.

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Pubuditha Abeyasinghe
Western University

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