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### **Transition Pathways Connecting Stable and Metastable Ordered Phases**

AN-CHANG SHI, McMaster University

Phase transitions are ubiquitous in nature. Understanding the kinetic pathways of phase transitions has been a challenging problem in physics and physical chemistry. From a thermodynamics point of view, the kinetics of phase transitions is dictated by the characteristics of the free energy landscape. In particular, the emergence of a stable phase from a metastable phase follows specific paths, the minimum energy paths, on the free energy landscape. I will describe the characteristics of the minimum energy paths and introduce an efficient method, the string method, to construct them. I will use membranes and block copolymers as examples to demonstrate the power of the method. In particular, I will show how precisely determined transition pathways provide understanding and surprises when we try to connect the different ordered phases.