

## *Becoming* as a Transition State in Spacetime.

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In describing the flow and direction of spacetime, it is self-evident that the *becoming* of events occurs as a spontaneous process. This perception allows one to apply knowledge and concepts based on mechanisms for spontaneous reactions from chemistry to explain the nature of *becoming* in terms of reaction kinetics. In this view, the dynamics of spacetime involves events that are coming to be and then passing away analogous to the *becoming* of products from reactants in a spontaneous chemical reaction. And, in contrast to the notion in physics that time flows from *past to present to future*, when viewed like an elementary reaction, the direction of time progresses from *future to present to past*. Moreover, similar to the progression of a chemical reaction in which the reactants interact and go on to form products, the interaction of “future time” events can be modeled as the *becoming* of “now time” events that progress to “past time” events. That time progresses because of the interaction of future time events at a given frame of reference, lets us understand how time’s flow and asymmetric direction occurs as a spontaneous reaction based on reasoning from transition state theory (TST). This theory has been used for nearly 100 years to understand mechanisms of molecular reactions. In TST, the interaction of the reactants leads to formation of an instantaneously activated complex during a transition state in the progression to products. Notably, TST also assumes that a quasi-equilibrium exists between the reactants and the activated transition state. The reaction products are then irreversibly formed from the transition state. By applying TST to explain progression of events in spacetime, we can begin to understand the thermodynamics (energy & entropy) of *becoming* in transition of future time events to past time events. Accordingly, a mathematical model was created for the kinetics of spacetime events whereby an activated transition state occurs as a now time event in the progression of future time events to past time events. In this view, *becoming* is considered to be an instantaneous transition state in the progression of future to past. Additionally, based on TST, a quasi-equilibrium exists between future time events and now time events which establishes a superposition-like state whereby time fluctuates forward and backward between future time and now time. From the transition state, the now time events can (based on the activation energy) irreversibly progress to past time events. Not only does thinking from TST provide a mechanism to understand the difference between the flow of time and arrow (direction) of time, it also allows us to explore (based on autocatalysis) why the flow of time is perpetual. Thus, when TST is applied to explain spacetime, it provides a mechanism-based approach to understand *becoming* as the instantaneous activated transition state in the progression of future time events to past time events.