

1154-18-2182

David Weisbart and **Adam Yassine***, University of California, Riverside, 900 University Ave.,
Riverside, CA 92521. *Generalized Span Categories in Classical Mechanics.*

Category theory is a language that is capable of reducing complicated problems to a very basic form. While the last several centuries have seen an intensive study of classical mechanics, many philosophical questions about classical mechanics remain that category theory may potentially answer. The current work initiates a study of the categorical structures that underlie classical mechanics. While span categories are useful in the categorification of systems, they do not appear capable of describing the composition of classical mechanical systems. We introduce the notion of a generalized span category and an augmentation of a generalized span category. We construct the augmented generalized span categories LagSy and HamSy that respectively provide a categorical framework for the Lagrangian and Hamiltonian descriptions of certain simple classical systems. The morphisms in the appropriate category contain all kinematical and dynamical information about these physical systems and composition of morphisms corresponds to the construction of systems from subsystems. A functor from LagSy to HamSy translates between the Lagrangian and Hamiltonian perspectives. (Received September 17, 2019)