While deep learning has shown tremendous success in many domains, it remains a grand challenge to incorporate physical principles into such models for applications in physical sciences. In this talk, I will discuss (1) Turbulent-Flow Net: a hybrid approach for predicting turbulent flow by marryng well-established computational fluid dynamics techniques with deep learning (2) Equivariant Net: a systematic approach to improve generalization of spatiotemporal models by incorporating symmetries into deep neural networks. I will demonstrate the advantage of our approaches to a variety of physical systems including fluid and traffic dynamics.