

# Translational AI Center (TrAC) Seminar Fall 2022

**Hailiang Liu**

**September 9 at 12:00 noon (US Central Time)**

Physical location: 2206 Student Innovation Center

Zoom: <https://iastate.zoom.us/j/92178103551?pwd=dINCa2l0ckVBTEVyR1JEN2Y3b21XQT09>

## **Data-driven optimal control with neural network modeling of gradient flows**

### **Abstract**

In this project we attempt at developing a data-driven optimal control approach which integrates the observed data with the neural dynamics for differential equations. We begin with a basic gradient flow model, the model operator is unknown and learned from the data. We provide efficient numerical algorithms based on the optimal control theory, and obtain rigorous error bounds. Some numerical experiments demonstrate the effective performance of the proposed approach.

### **Short Bio**

Hailiang Liu is Professor of Mathematics, and also Professor of Computer Science (by courtesy) at the Iowa State University (ISU). His primary research interests include analysis of applied partial differential equations, the development of novel, high order algorithms for the approximate solution of these problems, and the interplay between analytical theory and computational aspects of such algorithms with various applications. His current research focus is on the mathematical theory of deep learning and PDE-based data-driven modeling.