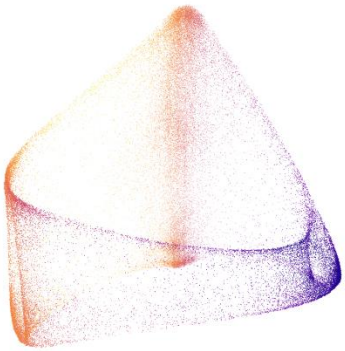
INSTITUTE FOR PURE AND APPLIED MATHEMATICS

LOS ANGELES, CALIFORNIA



Validation and Guarantees in Learning Physical Models: From Patterns to Governing Equations to Laws of Nature

October 28 – November 1, 2019

ORGANIZING COMMITTEE: **Steve Brunton** (Washington), **Eurika Kaiser** (Washington), **Marina Meila** (Washington), and **Christof Schuette** (Freie Universität Berlin)

Scientific Overview

Research in physics is often concerned with establishing the governing equations of a dynamical system. As systems become increasingly complex and data more abundant, machine learning (ML) is becoming a standard approach for modeling physics, yet the full power of statistical learning is rarely used.

This workshop will showcase how to employ mathematical aspects of statistical / information theoretic approaches in ML for the discovery of physical laws from data. Offering statistical guarantees along with the learned models is critical in physics and in areas such as aeronautics, climate science, chemistry, biology, and robotics. We will consider model selection, robust statistics, model-free and adaptive learning, and model validation in the context of both static and dynamic models, such as equations of motion.

This workshop will include a poster session; a request for posters will be sent to registered participants in advance of the workshop.

Speakers

Jelena Bradic (UCSD); **Joan Bruna** (NYU); **Steve Brunton** (Washington); **Jens Eisert** (Freie Universität Berlin); **Mohammad Farazmand** (MIT); **Boumediene Hamzi** (Imperial College); **Moritz Hardt** (UC Berkeley); **Eurika Kaiser** (Washington); **Petros Koumoutsakos** (ETH Zurich); **Samory Kpotufe** (Princeton); **Gitta Kutyniok** (Technische Universität Berlin); **Po-Ling Loh** (Wisconsin-Madison); **Jean-Christophe** Loiseau (École Nationale Supérieure d'Arts et Métiers); **Mauro Maggioni** (Johns Hopkins); **Krithika Manohar** (Caltech); **Marina Meila** (Washington); **Klaus-Robert Müller** (Technische Universität Berlin); **Paris Perdikaris** (Penn); **Maziar Raissi** (Brown); **Aaditya Ramdas** (Carnegie Mellon); **Philippe Rigollet** (MIT); and **Denis Zorin** (NYU).

Participation

Additional information about this workshop including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.

www.ipam.ucla.edu/mlpws3