

Michela Paganini

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Education

Yale University

Ph.D., Physics, in progress (expected 2018)
M.Phil., Physics, 2016
M.S., Physics, 2014 - student marshal

University of California, Berkeley

B.A., Astrophysics, 2013
B.A., Physics, 2013

University of Cambridge

Pembroke-King's Programme, 2012

Dissertation

Tentative title: *Machine Learning Solutions for High Energy Physics – an application to the search for Higgs boson pairs in the $\gamma\gamma b\bar{b}$ final state using pp collision data at $\sqrt{s} = 13$ TeV with the ATLAS detector*
(in progress)

Research

CERN (European Organization for Nuclear Research)

Ph.D. Student, ATLAS Experiment
2013 - present

- Building location-aware auxiliary-classifier Generative Adversarial Networks for fast, detector-level physics simulation.
- Prototyping object permutation selection using pointer network-inspired neural net architectures.
- Pushing multi-stream LSTMs for event-level classification into production for the $hh \rightarrow \gamma\gamma b\bar{b}$ analysis.
- Designed recurrent neural networks for impact parameter based flavor tagging in the ATLAS experiment. Leading effort to integrate into live analysis deployment.
- Using Dark Knowledge to replace the Matrix Element Method (MEM) — a Physics driven, computationally intensive routine — in order to streamline the $t\bar{t}H$ with $H \rightarrow b\bar{b}$ analysis pipeline.
- Refined boosted top-tagging technique using Deep Learning discrimination versus QCD background. Performed in-depth studies of pile-up and p_T dependence. Compared efficiency with substructure taggers.

Cambridge Institute of Astronomy

Summer Exchange Student

July-August 2012

- Galactic dynamics, mass-velocity profiles, and anisotropy variation.

Università degli Studi di Milano

Summer Research Assistant

June 2012

- Neutrino Physics at the Borexino experiment, Gran Sasso National Laboratory.
- Positronium formation studies for anti-hydrogen production at the AEGIS experiment at CERN

SETI Institute, University of California, Berkeley

Undergraduate Research Assistant

2011

- Remote observing for Optical SETI.

Space Sciences Lab, University of California, Berkeley

Undergraduate Research Assistant

2010-2011

- Data collection and analysis for MAVEN, STEREO and VEX missions.
- Catalogs of coronal mass ejections, live monitoring of solar activity.

Teaching

Department of Physics, Yale University

Teaching Fellow, Physics 440 (Quantum Mechanics and Natural Phenomena I), Spring 2015

Teaching Fellow, Physics 180 (University Physics - Mechanics), Fall 2014

Teaching Fellow, Physics 166L (General Physics Laboratory - E&M), Spring 2014

Teaching Fellow, Physics 165L (General Physics Laboratory - Mechanics), Fall 2013

College of Letters and Science, University of California, Berkeley

Undergraduate Student Instructor (UGSI), Sense and Sensibility and Science, 2012-2013

Reader, Physics H7A (Physics for Scientists and Engineers), 2012

Publications

The ATLAS Collaboration, *Identification of Jets Containing b-Hadrons with Recurrent Neural Networks at the ATLAS Experiment*, [ATL-PHYS-PUB-2017-003].

L. de Oliveira, M. Paganini, B. Nachman, *Learning Particle Physics by Example: Location-Aware Generative Adversarial Networks for Physics Synthesis*, [arXiv:1701.05927].

The ATLAS Collaboration, *Search for Higgs boson pair production in the $b\bar{b}\gamma\gamma$ final state using pp collision data at $\sqrt{s} = 13$ TeV with the ATLAS detector*, [ATLAS-CONF-2016-004].

Languages and Skills

Languages: Italian, English (bilingual), French (intermediate), Spanish (elementary), Latin
Computing: Python, C, C++, Matlab, LabView, IDL, L^AT_EX, Docker, Git, Arduino, HTML
Libraries: NumPy, SciPy, Matplotlib, TensorFlow, Keras, scikit-learn, pandas, ROOT
Interpersonal Skills: Management, Event Planning, Effective Communication, Active Listening, Leadership, Flexibility

Awards and Fellowships

Leigh Paige Prize

Yale Physics Department, 2013

UC Summer Grant

University of California, Berkeley, 2012

University of California Undergraduate Grant

University of California, Berkeley, 2011-2012

UC Freshman Scholarship

University of California, Berkeley, 2010

Invited Talks

Fermilab Machine Learning Group Kick-Off, FNAL, May 2017

Data Science @ HEP Workshop, FNAL, May 2017

Blue Brain Project: Machine Learning meets Biology, Campus Biotech, May 2017

AI at SLAC Seminar, SLAC, March 2017

Inter-Experimental Machine Learning Workshop, CERN, March 2017

Developers@CERN Forum, CERN, May 2016

HEP Software Foundation Workshop, LAL Orsay, May 2016

Outreach and Leadership

CERN

S'Cool Lab Tutor

Open Geneva Hackathon, *Preventing Suicide with Social Media Data*

DiploHack, *Extracting Sensitive Human Rights Data from Inaccessible Countries*

TEDxCERN Volunteer

THEPort CERN Hackathon, *Integrating Humanitarian Data*

POP Science, Nuit des Chercheurs

CERN Guide

Yale University

Graduate Student Assembly - Representative for Department of Physics

Graduate School of Arts and Science Executive Committee

Academics and Professional Development Committee Secretary

McDougal Graduate Student Life Fellow

Yale Minority Advisory Council - Graduate Representative

Board Member of Italian Society of Yale Students and Affiliates

Graduate Affiliate at Pierson Residential College

Co-Founder of iUSA (Italian University Societies in America)

University of California, Berkeley

Society of Physics Students (SPS) Officer

SWPS Physics Undergraduate Coordinator

Member of Order of Omega Leadership Honor Society

Academic Tutor at Athletic Study Center

Founder of Italian Society at Berkeley

Team Manager - Div I Women's Tennis Team

Emerging Leaders Institute at Butler University

References

Prof. Paul Tipton
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Yale University
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Prof. Tobias Golling
Department of Particle and Nuclear Physics
University of Geneva
tobias.golling@unige.ch

Prof. Amir Farbin
Department of Physics
University of Texas, Arlington
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