

Luke de Oliveira

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Current Positions

Senior Machine Learning Engineer, Twilio, Inc., San Francisco, CA

Visiting Affiliate, Lawrence Berkeley National Laboratory, Berkeley, CA

Advisor, Holloway (Feynman Labs, Inc.), San Francisco, CA

Advisor, The Hive, LLC, Palo Alto, CA

Areas of Specialization

Deep Learning • Natural Language Processing • Generative Models • Simulation in Particle Physics

Academic Appointments

- 2018- *Visiting Affiliate*, National Energy Research Scientific Computing Center, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
- 2016-2018 *Visiting Affiliate*, Physics Division, Lawrence Berkeley National Laboratory, Berkeley, CA, USA
- 2015-2016 *Course Instructor*, Stanford University, Stanford, CA, USA
- 2015-2016 *Member*, ICME C^2 Consulting Group, Stanford University, Stanford, CA, USA
- 2014-2016 *Research Affiliate*, SLAC National Accelerator Laboratory, Menlo Park, CA, USA
- 2014 *Affiliate*, Université de Genève, Geneva, CH
- 2012-2015 *Affiliate*, ATLAS Collaboration, CERN, Geneva, CH
- 2011-2012 *Research Affiliate*, Yale Law School, New Haven, CT, USA

Industry Positions

- 2018- *Senior Machine Learning Engineer*, Twilio, Inc., San Francisco, CA, USA
- 2018- *Advisor*, Holloway (Feynman Labs, Inc.), San Francisco, CA, USA
- 2015-2018 *Founder & CEO*, Vai Technologies, LLC (Acquired by Twilio, Inc.), San Francisco, CA, USA
- 2015- *Advisor*, The Hive, LLC, Palo Alto, CA, USA
- 2015-2017 *Advisor*, Astound/Neva, Inc., Menlo Park, CA, USA
- 2016 *Data Scientist*, Enlitic, Inc., San Francisco, CA, USA

Education

- 2016 M.Sc. in Computational and Mathematical Engineering, ICME, Stanford University
- 2014 B.S. in Applied Mathematics, Yale University

Grants, Honors & Awards

- 2014-2016 Stanford Graduate Engineering Fellowship, Stanford University
2014 John E. Linck III Prize, Yale University
2013 Alan S. Tetelman Fellow, Yale University
2013 Linck Fellow, Yale University

Publications & Talks

JOURNAL ARTICLES

- 2018 Paganini, M., **de Oliveira, Luke**, and Nachman, B., “Accelerating Science with Generative Adversarial Networks: An Application to 3D Particle Showers in Multilayer Calorimeters”, *Physical Review Letters, APS*, (2018) 97: 014021. <https://doi.org/10.1103/PhysRevD.97.014021>
- 2018 Paganini, M., **de Oliveira, Luke**, and Nachman, B., “CALOGAN: Simulating 3D high energy particle showers in multilayer electromagnetic calorimeters with generative adversarial networks”, *Physical Review D, APS*, (2018) 120: 042003. <https://doi.org/10.1103/PhysRevLett.120.042003>
- 2017 **de Oliveira, Luke**, Paganini, M. and Nachman, B., “Learning Particle Physics by Example: Location-Aware Generative Adversarial Networks for Physics Synthesis”, *Comput. Softw. Big Sci.*, (2017) 1: 4. <https://doi.org/10.1007/s41781-017-0004-6>
- 2016 **de Oliveira, Luke**, Kagan, M., Mackey, L. et al., “Jet-images – deep learning edition”, *Journal of High Energy Physics*, (2016) 2016: 69. [https://doi.org/10.1007/JHEP07\(2016\)069](https://doi.org/10.1007/JHEP07(2016)069)

PREPRINTS

- 2018 **de Oliveira, Luke**, Paganini, M. and Nachman, B., “Electromagnetic Showers Beyond Shower Shapes”, [arXiv/1806.05667](https://arxiv.org/abs/1806.05667)
- 2018 HEP Software Foundation: J. Apostolakis et al., “HEP Software Foundation Community White Paper Working Group - Detector Simulation”, [arXiv/1803.04165](https://arxiv.org/abs/1803.04165)

CONFERENCE & WORKSHOP CONTRIBUTIONS

- 2017 **de Oliveira, Luke**, Paganini, M., Nachman, B. “Tips and Tricks for Training GANs with Physics Constraints”, *NIPS 2017, Workshop on Deep Learning in the Physical Sciences*, Long Beach, CA, USA (Poster)
- 2017 Paganini, M., **de Oliveira, Luke**, Nachman, B. “Survey of Machine Learning Techniques for High Energy Electromagnetic Shower Classification”, *NIPS 2017, Workshop on Deep Learning in the Physical Sciences*, Long Beach, CA, USA (Poster)
- 2017 **de Oliveira, Luke**, Paganini, M., Nachman, B. “Controlling Physical Attributes in GAN-Accelerated Simulation of Electromagnetic Calorimeters”, *Proceedings of the 18th International Workshop on Advanced Computing and Analysis Techniques in Physics Research, J. Phys. Conf. Ser.*, Seattle, WA, USA. <https://dx.doi.org/10.1088/1742-6596/1085/4/042017>
- 2016

Schwartzman, A., Kagan, M., Mackey, L., Nachman, B. and **de Oliveira, Luke**, “Image Processing, Computer Vision, and Deep Learning: new approaches to the analysis and physics interpretation of LHC events”, *Proceedings of the 17th International Workshop on Advanced Computing and Analysis Techniques in Physics Research, J. Phys. Conf. Ser.*, Valparaiso, Chile. <http://dx.doi.org/10.1088/1742-6596/762/1/012035>

2016 Kagan, M., **de Oliveira, Luke**, Mackey, L., Nachman, B., and Schwartzman, A. “Boosted Jet Tagging with Jet-Images and Deep Neural Networks”, *Proceedings of Connecting the Dots 2016, EPJ Web of Conferences, Volume 127, id.00009*, Vienna, Austria. <https://doi.org/10.1051/epjconf/201612700009>

SELECT INVITED TALKS

2018 “The Future of Machine Learning in High Energy Physics”, Plenary Talk, *Inter-experimental Machine Learning Workshop, CERN*, Geneva, Switzerland.

2018 “Accelerating Simulation with GANs”, *Workshop on Machine Learning for Particle Accelerators, SLAC National Accelerator Laboratory*, Menlo Park, CA, USA.

2018 “Adversarial Deep Learning in High Energy Physics”, *SMP-J Annual Workshop, CMS Collaboration, CERN*, Geneva, Switzerland.

2017 “Introduction to Generative Adversarial Networks”, *IML Machine Learning Working Group, CERN*, Geneva, Switzerland.

2017 “Learning Particle Physics by Example: Accelerating Science with Generative Adversarial Networks”, *GPU Technology Conference*, San Jose, CA, USA.

2017 “Meta Learning”, *Workshop on Machine Learning for Jets*, Berkeley, CA, USA.

2015 “Jet-images & Deep learning”, *NIPS 2015, ALEPH Workshop*, Montréal, Canada.

2015 “A ground-up construction of deep learning”, *Data Science @ LHC workshop*, Geneva, Switzerland.

2014 “Random Forests, Feature Selection, and Large-Scale Predictive Methods”, *Guest Lecture, R. W. Johnson Clinical Scholars Program, Yale Medical School*, New Haven, CT, USA.

SELECT CONTRIBUTED TALKS

2017 “Generative Adversarial Networks for Simulation”, *18th International Workshop on Advanced Computing and Analysis Techniques in Physics Research*, Seattle, WA, USA.

2017 “Deep Learning for Practical Natural Language Processing”, *Open Data Science Conference, West*, Burlingame, CA, USA.

Teaching

2018 *Course Instructor*, Deep Learning for Natural Language Processing, Summer Workshop Series, Stanford University

2017 *Course Instructor*, Natural Language Processing, Summer Workshop Series, Stanford University

2015-2016 *Course Instructor*, Scientific Python (CME193), Stanford University

Service to the Profession

2018 *Reviewer*, Computing and Software for Big Science (*Springer*)

2017 *Reviewer*, Nature Communications

2017 *Reviewer*, 18th International Workshop on Advanced Computing and Analysis Techniques in Physics Research

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