

Constantin N. Weisser

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- EDUCATION** **Massachusetts Institute of Technology** Sep 2015 - Apr 2021 | Cambridge, MA
Ph.D. Physics, Statistics & Data Science: Machine Learning in Particle Physics; GPA: 5.0/5
and search for hypothetical "Dark Photon" particles at CERN Advisor: Mike Williams
- University of Manchester** Sep 2011 - Jun 2015 | Manchester, UK
Integrated Master of Physics [Undergraduate], Sustained Outstanding Performance Award (top 5%)
- University of California, Berkeley Study Abroad** Sep 2013 - Jun 2014 | Berkeley, CA
- EXPERIENCE** **McKinsey & QuantumBlack Data Science Consultant** Apr 2021 - now | Boston, MA
Harnessed data and advanced analytics to provide organizations with a clear path to improve performance. Worked on confidential projects in pharma, automotive and mining industries. Initiated a pro bono effort by returning to the Frontier Development Lab as ML and management lead to mitigate climate change by forecasting earthquakes near CO2 sequestration sites. Reduced training time of a SOTA model from 22h to 2 hours on a tablet and made it accessible to CO2 operators to enable nuanced decision making and safer operations, a requirement for scaling commercially.
- NASA Frontier Development Lab ML Researcher** Jun - Aug 2021 | Mountain View, CA
Sped up predictions of floods due to hurricanes and/or sea level rising by building a machine learning surrogate model for an established inundation height model, NEMO. First application of physics-informed state-of-the-art Fourier Neural Operator models to a real-world setting.
- Amazon Alexa Applied Science Intern: NLP in Health** Jun - Sep 2020 | Seattle, WA
Used seq2seq models to summarize proprietary text and developed a novel algorithm that removed pathologies and improved fluency. Won 1st place in a [code competition](#) against 26 SDEs.
- RESEARCH** **Goal:** Exploring the most fundamental laws of nature by colliding particles and studying probabilistic outcomes with camera-like detectors and machine learning; Understanding the discrepancy between our understanding of universe dynamics (Astrophysics) and its constituent parts (Particle Physics) in the following bolded steps; Personal contributions at MIT, Manchester, and CERN are listed below:
- Hardware: Electronics to Pixels;** For a 1,000 people experiment, oversaw 670 hours of the running period as specialist and 110 hours as Shift Leader; [Demonstrated radiation hardness of CMOS sensors](#)
- Reconstruction: Pixels to Tracks;** [Developed and updated a novel hybrid deep learning approach to vertexing](#), a GPU-friendly technique to determine the origin of particles, given detector pixel values
- Data Selection: 5TB/s to 2GB/s;** [Reduced data rates \(=10% of Facebook's data\)](#) as analysis group liaison and summary speaker; proposed further data reduction through VAEs and GANs ([ICLR 2020](#))
- Analysis: Messy to Clean;** Gathered 200TB of heterogeneous dirty data and combined them creatively with deep domain expertise to look for both [minimal](#) and [nonminimal](#) "Dark Photons"; estimated systematic errors conservatively and suggested a new method to [tackle AI Fairness in Physics](#)
- Hypothesis Testing: Histograms to Discovery;** [Introduced a high dimensional two sample statistical test](#) utilizing traditional and deep ML for dimensionality reduction coupled with a 1D KS test
- TEAM WORK** President of MIT Physics Graduate Student Council [1.5 years]; President of MIT Triathlon Club; Personally drafted MIT Physics **Value Statement**; 2nd place Boston Regional Datathon Citadel; "Best Science Case" as team Head of Science **European Space Agency** Alpach Summer School; 2nd place Yale Graduate Case Competition; 3rd place in MIT IAP "ML in Critical Care" Hackathon; Weekly **primary school mentor** at Berkeley Engineers and Mentors (BEAM); Volunteer ODSC East; **Goldman Sachs** Finance and Internal Audit Spring Intern; Education Award CERN's "Webfest";
- TECHNICAL SKILLS** **Programming:** Python (pytorch, keras, tensorflow, scikit-learn, numpy), C++ (STL and ROOT) , R
Machine Learning: Linear regression, CART, SVM, Naive Bayes, kNN, CNNs, RNNs, LSTM, GRU, BERT, VAE, GAN, PCA, SGD, ADAM, ensemble algorithms, LASSO & ridge regularization
Statistics: Hypothesis testing, frequentist confidence intervals, maximum likelihood estimation
Languages: German Native Speaker, Spanish B1, French A1
- INTERESTS** Social and Gold Level Ballroom Dancing, Travel (>40 countries), Triathlon (Completed **Ironman**), Mountaineering, Marathon, Trail Running, Rock Climbing, Fencing