Chao (Charles) Lu

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Education

- **Princeton University** **Princeton, New Jersey**
  *Ph.D. in **Mechanical and Aerospace** Engineering* 2009 – 2015
  – **Technical courses**: Algorithms, machine learning, software engineering, numerical methods, probability & statistics
- **University of California** **Santa Cruz, CA**
  *M.S. in **Electrical** Engineering* 2007 – 2008
  – **Honors**: Regents scholarship (highest honor)
- **Tsinghua University** **Beijing, China**
  *M.E. in **Optical** Engineering* 2005 – 2007
  *B.E. in Measurements, **Control** Technology and Instruments* 2001 – 2005
  – **Honors**: Academic excellence scholarship (top 5%, 3 times)

Qualifications

- Experienced alpha researcher constructed tens of high return alphas, from a wide range of datasets and models
- Full-skillset junior PM covering infrastructure, data, alpha, risk, optimization
- Seasoned programmer with mastery in Python, C/C++ and Unix
- Princeton-trained physicist with outstanding academic achievements

Professional experiences

- **Point72 Asset Management, Stamford, CT** **Apr. 2019 – Present**
  Quantitative Research Analyst
  – **Alpha research**:
    ◦ Researched, developed, and launched multiple **IAC and quant equity signals** using various datasets
    ◦ Conducted **fundamental research on consumer sector** using credit card transaction data; this signal is in production and has out-of-sample 15% annualized return and Sharpe ∼1.5 during 2020
    ◦ Built analyst revision signal using **internal idea rank** data, enhanced with a smart analyst model, where the skill of an analyst is evaluated; this signal has 5% return with Sharpe 3+
    ◦ Launched quantitative signal using short-term price dislocation caused by predictable **ETF rebalance flow**, this signal is running live, with 3% alpha return and Sharpe 3+
    ◦ Studied **industry classifications** based on business segments of companies; this vendor-built classification demonstrated ∼ 10% enhancement than the widely used GICS classification, and is running live in production
    ◦ Generated low-turnover fundamental signal using **earning transcript sentiments** data; this signal has 2-3% alpha return, 1+ Sharpe with large capacity
    ◦ Found **buy-side analysts** from smaller hedge funds collectively can predict stock return at 3-4% and Sharpe ∼ 1, with limited coverage (∼ 200 stocks)
    ◦ Researched longer-horizon **fundamental** data; this effort is on-going with the data (**Capital IQ**) cleaned and cached
    ◦ Other research topics including IAC quant interactions, IBES analyst model, vendor model etc
  – **Portfolio and infrastructure**:
    ◦ Close exposure to the investment process of **LSBI book**
    ◦ Developed a full python **back-test framework** with high performance data-cache
    ◦ Generated **in-house risk factors** effective in reducing the variance and drawdown of portfolios

- **Orsus Research (Quant arm of Lighthouse LLC), New York, NY** **Jan. 2018 – Jan. 2019**
  Assistant Portfolio Manager
  – Major responsible sub PM operating a global systemetic equity book of $1B (GMV), directly reporting to a distinguished senior PM; as this systematic trading group is a spinning-off from Melliunium systematic division, which managed multi-billion portfolio successfully the past decade
  – **Main responsibilities**: Lead the research of a group with 50MM USD statistical arbitrage, long/short and event-driven portfolios trading across North America, Europe and Japan; oversee the effort in alpha, risk and portfolio research, and are responsible for improving existing trading strategies as well as building new trading strategies with out-of-sample after-cost Sharpe ratios 2.9

- **Alpha research**: Explored new/non-trivial alpha signals and modeling methodologies with technical, analyst, fundamental, statistical, sentiment and sector specific factors; systematically improved existing alpha through turnover and risk reduction; tested machine learning approaches to factor construction, selection, weighting and dynamic timing
- **Portfolio construction**: Designed and improved statistical equity risk modes combined with Barra fundamental risk models, portfolio construction and optimization methodologies to make portfolio more adaptive and boost risk adjusted return
- **Live trading**: Day to day portfolio management, including making investment decisions by allocating assets among in-house developed strategies
- **Infrastructure and system**: Developed a full back-test framework to test global equity strategies (link to all available data sets, flexible design of signals, including portfolio construction with liquidity/trading constraints)

- **WorldQuant LLC, Beijing, China** **Mar. 2017 – Oct. 2017**
  Quantitative Researcher
  - **Alpha research and implementation**: Generated alpha ideas and implemented them using C++ and Python. Developed an automated simulation, back-testing and parameter optimization system in a supercomputing infrastructure environment, with 30,000 simulations performed per day. The alphas generated rank in the top 10% in OS/IS among WorldQuant researchers worldwide
  - **Price-volume strategies**: Boosted classical mean reversion strategies with various factors, such as implied periodicity of multiple technical indicators, historical volatility, and intra-day interval price; developed industry momentum strategies
  - **Analyst revision strategies**: Constructed multiple analyst revision alphas using various datasets, such as IBES and BBO Estimates; applied calendar effects and time series techniques to purify the signals
  - **Fundamental strategies**: Formulated fundamental ratios from various datasets, such as Compustats, Thomson Reuters Point-in-Time and FactSet; developed alphas from the time-series trend and cross-sectional statistics of the fundamental ratios; used regression to decompose fundamental factors from size and sector effects; the alphas generated have low turnover and high Sharpe ratio
  - **Group momentum strategies**: Developed group momentum alphas using supply chain lead-lag relations; utilized both relationship and fundamental data to optimize the performance of these alphas
  - **Other strategies**: Built various alpha signals: news, insider trading, vendor model, short interest, calendar effect, and macro style selection methodology

- **Part-time quantitative strategies research, New York, NY** **2016 – 2017**
  - **Macro/equity alpha research**: Joined a macro/equity alpha research workshop funded by a prestigious PM from Pureheart capitals, with the purpose to develop quantitative equity and multi-asset alpha strategies; alpha could potentially receive seeding and be traded on their platform
  - **Infrastructure building**: Generated the full-scale data, back-testing, and portfolio construction infrastructures
  - **Future-based equity timing strategy**: Developed macro intuitions and chose indicators, generated expanding window regression, and tested strategy using historical data from Haver-macro going back to the 1970s, with five year in-sample calibration and re-configure each year. The strategy proves to have good out-of-sample Sharpe ratio and was adpoed by the PM in real trading
  - **Alpha idea generation**: Developed ideas from academic papers and analyst reports, such as Alphaletter, DBQuant

- **Pharmaseq Inc., NJ** **2015 – 2016**
  Research Scientist
  - Served as a lead researcher in a new instrument design project, funded by NIH and NSF grants, that targets high-speed sorting of ultra-small electronic chips carrying DNA fragments
  - Implemented C++ platform with real-time requirements for control, data collection, and analysis
  - Developed quantitative model of fluid dynamics; built liquid control system based on the simulation results

Academic experiences

- **Applied Physics Group, MAE Department, Princeton University, NJ** **May 2012 – Aug. 2015**
  Research Assistant, advised by Prof. Craig Arnold and Prof. Marlan O. Scully
  - Developed theoretical framework and quantitative model for photoinduced surface structure in amorphous thin films, which laid foundations to unify all the optical induced vector effects in amorphous materials

- Built infrastructure to fabricate uniformly dispersed nanoparticle-doped chalcogenide glass, which has significance in device fabrication of broader semiconductor industry
- Achieved single-step synthesis of Ag_2S nanocrystals in arsenic sulfide; discovered new chemical reactions
- Fabricated chalcogenide photonic crystal light emitter through cleanroom techniques and solution process, which expanded group research to cover nano-photonics field
- Conducted in-depth research at the frontier of quantum physics, including superradiance of the atomic system inside the femtosecond laser generated plasma
- Investigated lasing without inversion X-ray lasers based on ionization-recombination of atomic excitation

- **Institute of Opto-electronic Engineering, Tsinghua University, Beijing** **Sep. 2005 – July 2008**
  Research Assistant, advised by Prof. Guofan Jin & Prof. Claire Gu
  - Fabricated inner wall coated hollow core waveguide sensor based on double substrate SERS
  - Quantitatively modeled collectible optical power of various shaped multimode fiber probes for contact sensing

Journal Publications

6. Juliana M. P. A., **Chao Lu**, Cleber R. Mendonça, Craig B. Arnold, "Single-step synthesis of silver sulfide nanocrystals in arsenic trisulfide," Opt. Mater. Express 5, 1815-1821 (2015)
5. **Chao Lu**, Juliana M. P. A., Nan Yao and Craig Arnold, "Fabrication of uniformly dispersed nanoparticle-doped chalcogenide glass," Appl. Phys. Lett. 105, 261906 (2014)
4. **Chao Lu**, Daniel Recht and Craig Arnold, "Generalized Model for Photoinduced Surface Structure in Amorphous Thin Films," Phys. Rev. Lett. 111, 105503 (2013)
3. Hui Xia, A. A. Svidzinsky, Luqi Yuan, **Chao Lu**, S. Suckewer, and Marlan Scully, "Observing Superradiant Decay of Excited-State Helium Atoms Inside Helium Plasma," Phys. Rev. Lett. 109, 093604 (2012)
2. Chao Shi, **Chao Lu**, et. al., "Inner wall coated hollow core waveguide sensor based on double substrate surface enhanced Raman scattering," Appl. Phys. Lett. 93, 153101 (2008)
1. **Chao Lu**, Claire Gu, Liangcai Cao, Qingsheng He and Guofan Jin, "Collectible optical power of various specially shaped multimode optical fiber probes for contact sensing," Opt. Eng., Vol. 47, 010502 (2008)