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## Objective

Chief research scientist with cross-discipline entrepreneurial and academic successes ready to leverage record to lead an inventive team to create amazing technology that pushes our boundaries of knowledge and creates the sense that we have moved into the future.

## Leadership Vision

- **Research Minded:** Measurable record of scientific & technical development drives confidence.
- **Sciences Perspective:** Physics trained; unification of technical disciplines drives innovation.
- **Scalable Technology:** Day one ideation must be built to scale engineering to drive capacity.
- **Team Built:** Inventive people resourced to do seemingly impossible tasks drives human capital.
- **Knowledge:** Centralized knowledge scales org capital; individual autonomy drives org scale.

## Education

**Cornell University, Ithaca, NY**  
**Ph. D. in Physics, Science Communications Minor (2012)**

Dissertation: *Non-Redundant Aperture Masking Interferometry with Adaptive Optics: Developing Higher Contrast Imaging to Test Brown Dwarf and Exoplanet Evolution Models*

- Awarded Cornell Graduate Fellowship 1 year (awarded to 2 of 25 incoming class)
- Overall Teaching Effectiveness' student evaluation (73 responses): 4.7/5.0
- Popular Book Prospectus: *Meet Your New Neighbors: Planetary Systems of Nearby Stars*

**California Institute of Technology, Pasadena, PA**  
**B.S. in Physics (2002)**

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## Research-Oriented Experience

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### Chief Scientist (2014-Current)

WorkFusion, New York, NY

- Lead designer of human-in-the-loop framework and information sciences solutions.
- Lead designer of team of four information scientists and eight engineers for HITL platform development; eight month effort; customer facing; primary revenue initiative
- Created ML, NLP verticals, assist OCR, CV; please contact directly for project highlights.
- Lead on innovating crowdsourcing analytics and implications for HITL business models
- Responsible for leading scientific methodologies of R&D team and propagating thought leadership to all parts of the company (marketing, biz dev, eng, customer success).
- Steady empowerment of team with cutting edge research; academic to R&D within weeks; R&D to product within weeks; reshaping R&D sprints to integrate with engineering
- Product marketing technical lead; nearly all communications of human-in-the-loop methodology and insights; major web site voice on tech along with CTO.
- External technical leader for academic partnerships and customer success.

### Aerospace Engineering Postdoc / Founder, AgraSat (2014)

Cornell University, Mechanical and Aerospace Engineering Department, Ithaca, NY

- Founded & co-led cross-University research team which completed technical and market analysis for an imaging spectroscopic small satellite mission customized for agriculture.
- Framework multi-agent simulation for tradespace optimization of small satellite constellations for end-to-end request & deliver of imagery and communication bandwidth.

### **Research Engineer for Google AI Team (SWE III) (2013)**

Google, Inc., New York, NY

- Designed and implemented natural language question answering methods for artificial intelligence application.
- Embraced academic literature for methods design and to motivate team discussion.

### **Neuroscience and Brain-Machine Interface Postdoc (2012)**

SUNY Downstate Medical Center, Brooklyn, NY

- Built specialized machine and reinforcement learning algorithms for robotic arm interfacing with multiple neural sensor modalities, primarily infrared brain imaging and EEG.
- Created two novel infrared imaging methods with patents pending: *QuadCell fNIRS Instrument System* and *fNIRS Mount Device for Higher Precision Measurement*.

### **Astrophysics and Infrared Optics Researcher (2007-2011)**

Cornell University, Ithaca, NY with Dr. James Lloyd

- Continued NSF and NASA grant funded research of infrared telescopic optics using Fourier spatial frequencies for high resolution imaging of early brown dwarfs and exoplanets.
- Extensively built custom data taking simulation, analysis, and statistics pipelines.
- Initiated collaboration that developed image extraction techniques with Integral Field Spectrograph, the first of its kind, which provides highest contrast imaging in the field.
- Target selection and authored five successful University observing proposals.
- Authored/co-authored four peer-reviewed papers, and contributed to three others.

### **Early-Universe Cosmology Researcher (2005-2007)**

Cornell University, Ithaca, NY with Dr. Rachel Bean

- Used perturbative and numerical methods to predict that modifications to General Relativity are inconsistent with pre-existing observational data of galaxy clusters.

### **Goldman Sachs Trading Strategist (2002-2004)**

Fixed Income, Commodities, and Currencies Division, Goldman Sachs, New York, NY

- Addressed quantitative needs of traders by quickly and flexibly developing numerical algorithms or expanding the utility of those developed by “quants.”
- Expanded Monte Carlo engine to calculate high-loss, low-probability risk valuation of department portfolios in real time. Daily reports were viewed by Directors.
- Co-authored new model that back-engineered currency prices to reveal the likelihood that the Federal Reserve would change US interest rates.
- Assisted in development of first-of-its-kind calculator for customer credit default risk. Incorporated this into derivatives pricing to minimize firm exposure to market-wide defaults.
- Mathematical liaison to spread our risk calculators and train strategists of other divisions.

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## **People-Oriented Experience**

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### **Teaching**

**Manhattan College, Riverdale, NY (Professor)**

*Introduction to Astronomy* (2011)

- Developed full curriculum with lecture and homework materials.

**Cornell University, Ithaca, NY (Teaching Assistant)**

*Physics of the Heavens and Earth* (2006)

*Modern Astrophysical Techniques* (2010)

*Physics I: Mechanics* (2011x2)

*Experimental Optics* (2010)

*Physics II: Electricity & Magnetism* (2007x2)

*Electronic Circuits* (2008)

*Physics III: Optics, Waves, and Particles* (2007, 2005)

- Highest evaluated teacher on several courses; median score: 4.7/5.0 (73 responses)
- Wrote and presented hundreds of hours of lecture across subjects and disciplines.

**California Institute of Technology, Pasadena, NY** (Teaching Assistant)  
*Experiments in Atomic and Nuclear Physics* (2002)

### Service, Outreach, and Leadership

- Google Anita Borg Woman in Engineering Finalist Review Committee (2013)
- Cornell Ask An Astronomer writer and podcast leader (2007-2011; [tiny.cc/curiousAAA](http://tiny.cc/curiousAAA))
- Graduate & Professional Student Assembly Field Rep 2008
- Vice President Physics Graduate Society 2007
- Adopt-A-Physicist: 2008-2010 and Expand Your Horizons: 2008, 2010
- Four year athlete and one year captain of Caltech's NCAA Men's Baseball Team

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## Publications, Patents, and Grant Awards

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### Peer-Reviewed Publications

- [PP7] Zimmerman, N., Sivaramakrishnan, A., **Bernat, D.**, Oppenheimer, B., and 7 others, *Aperture Masking Interferometry with an Integral Field Spectrograph*, 2012, SPIE
- [PP6] **Bernat D.** et al. *The Use of Spatial Filtering With Aperture Masking Interferometry With Adaptive Optics*, 2011 ApJ
- [PP5] West, Andrew and 19 others incl. **Bernat, D.**, *The Sloan Digital Sky Survey DR7 Spectroscopic M Dwarf Catalog I: Data*, 2011 ApJ
- [PP4] Hinkley, Sasha, and 26 others incl. **Bernat, D.**, *Establishing Alpha-Oph as a Prototype Rotator: Improved Astrometric Orbit*, 2011 ApJ
- [PP3] **Bernat, D.**, Antonin, H., and 23 others. *A Close Companion Search Around L Dwarfs Using Aperture Masking Interferometry and Palomar Laser Guide Star Adaptive Optics*, 2010, ApJ
- [PP2] Howard, A. W., Johnson, J., and 13 others incl. **Bernat, D.**, *The California Planet Survey I. Four New Giant Exoplanets*, 2010, ApJ
- [PP1] Bean, R., **Bernat, D.**, Pogosian, L., Silvestri, A., Trodden, M., *Dynamics of Linear Perturbations in  $f(R)$  Gravity*, 2007 Phys. Rev. D

### Patents

- [2] *fNIRS Mount Device for Higher Precision Measurement*, 2014 pending, SUNY Tech 1933
- [1] *QuadCell fNIRS Instrument System*, 2014 pending, SUNY Tech 1932

### Awarded Telescope Time

#### Palomar 200" PHARO/NGSAO

- [T4] *The Use of Spatial Filtering with Aperture Masking Interferometry* (2008-2009)
- [T3] *California Planet Survey Follow-up for Substellar Companions* (2009)
- [T2] *A Substellar Companion Search with NRM* (2008)

#### Palomar 200" PHARO/LGSAO

- [T1] *A Brown Dwarf Companion Search with NRM and LGSAO* (2008)