https://entrepreneurship.engineering.columbia.edu/discover/for-undergraduate-students/fast-pitch/

Fast Pitch— Wrap-Up

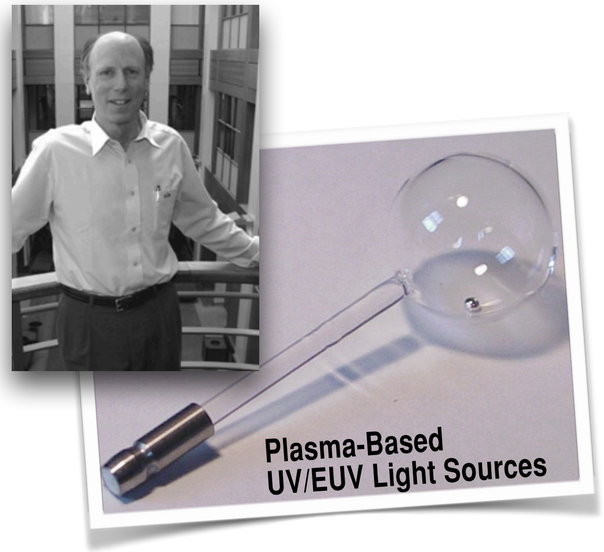
Discover → For Undergraduate Students → Fast Pitch

APPH E4901 and APPH E4903

Applied Physics Seminar

Applied Physics Entrepreneurship
"Wrap Up Discussion"

Applied Physics Examples: Photons



The Nobel Prize in Physics 2014

© Nobel Media AB. Photo: A. Mahmoud

Isamu Akasaki

Prize share: 1/3

© Nobel Media AB. Photo: A. Mahmoud

Hiroshi Amano

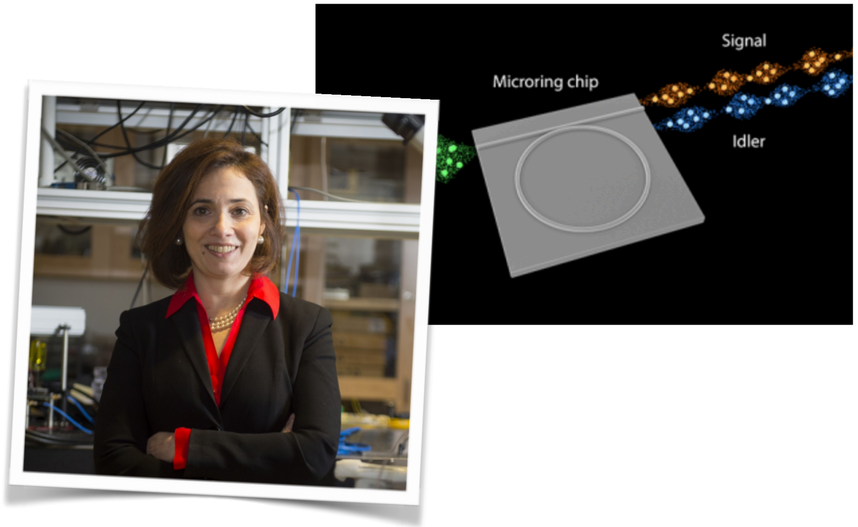
Prize share: 1/3

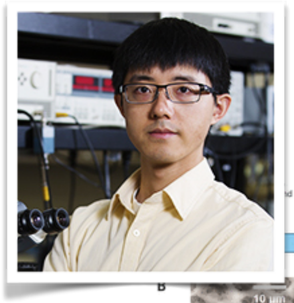
© Nobel Media AB. Photo: A. Mahmoud

Shuji Nakamura

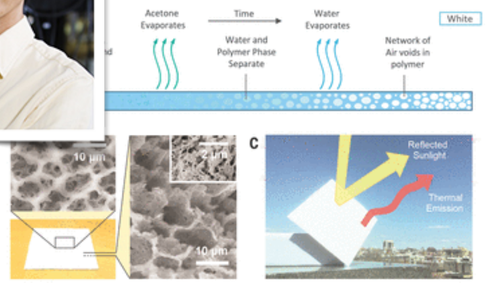
Prize share: 1/3

On-chip Quantum Optics



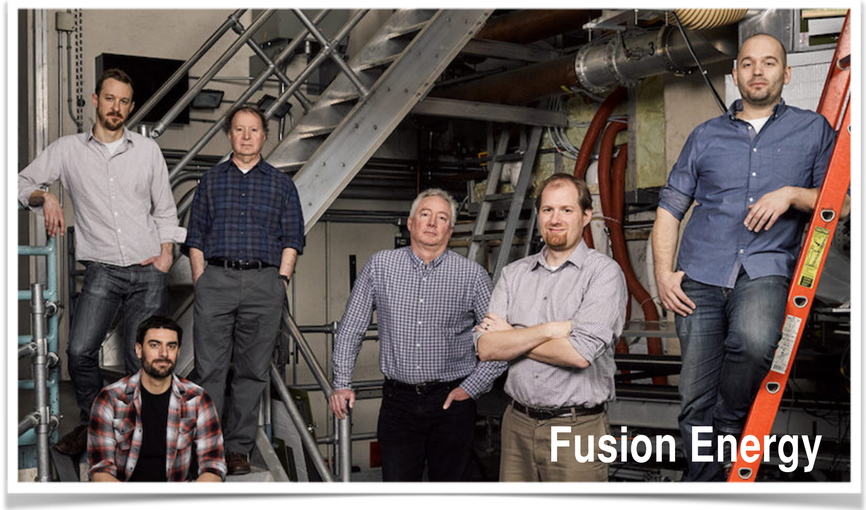


Nano-structured Optics



Applied Physics Examples: Plasmas

Semiconductor Tools



DESIGNLINES | INDUSTRIAL CONTROL DESIGNLINE

MKS acquires ASTeX for $300 million

MKS acquires ASTeX for $300 million

By EE Times, 10.02.00 0

ANDOVER, Mass. -- MKS Instruments Inc. here today announced that it has entered into a definitive agreement to acquire Applied Science and Technology Inc. (ASTeX), a supplier of sputtering equipment and other products, for $300 million in stock.

With the acquisition of ASTeX, based in Wilmington, Mass., MKS will gain a quick entry into the sputtering equipment, gas generator, RF and microwave power source, and other gas-reactive systems markets.

It will also give customers a one-stop shop of products in these markets. ASTeX makes subsystems and sputtering tools for the semiconductor industry, while MKS is a leading supplier of process control instruments for OEMs, such as Applied Materials Inc. and other equipment makers.

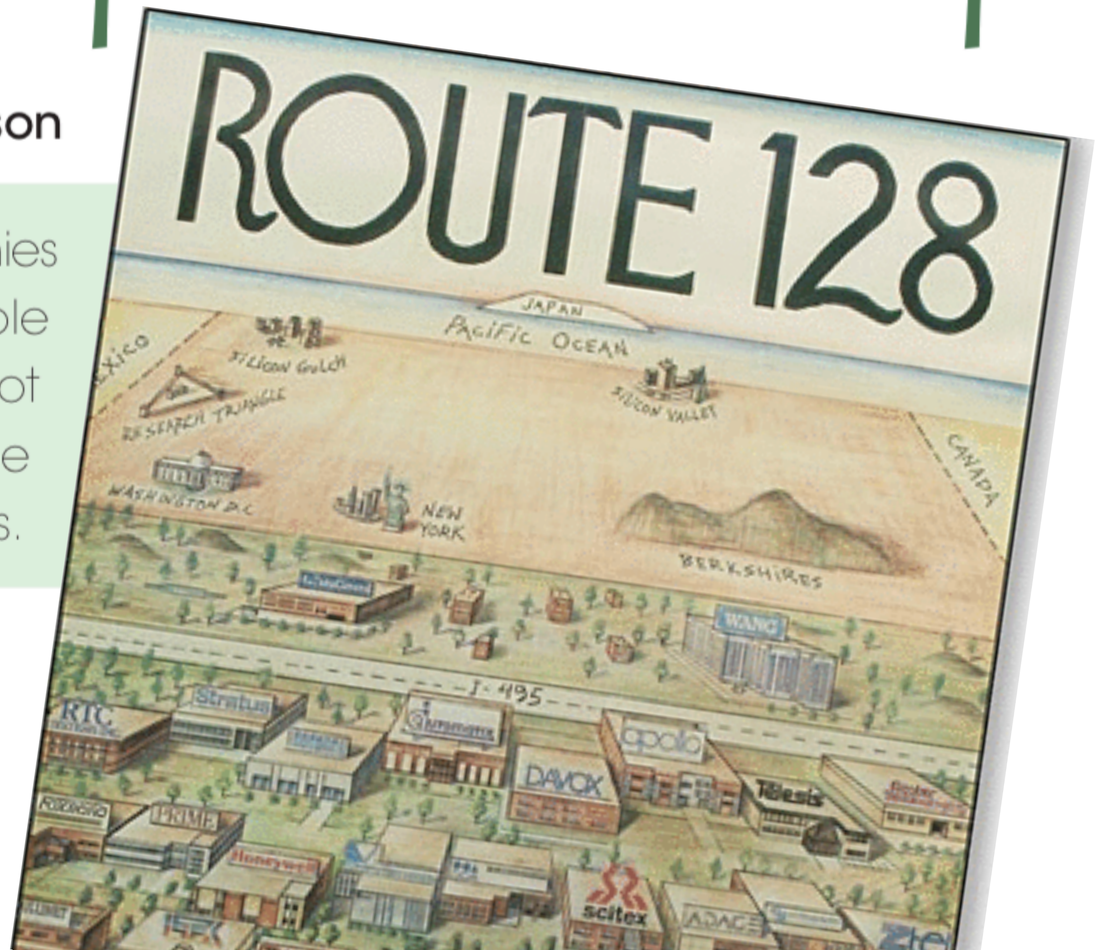
Commonwealth Fusion Systems
501 Massachusetts Avenue
Cambridge, MA
02139

Published in: Orville R. Butler; R. Joseph Anderson; *Physics Today* **65,** 39-45 (2012)
DOI: 10.1063/PT.3.1821

Risky business: A study of physics entrepreneurship

Orville R. Butler and R. Joseph Anderson

Physicists who work at startup companies create and improve marketable technologies. But their goals are not always aligned with those of the funders who pay the bills.



https://physicstoday.scitation.org/doi/10.1063/PT.3.1821

***Route 128**, near Boston, passes through a famously dense concentration of startup companies.*

About the Survey…

- Center for History of Physics at the American Institute of Physics (AIP) conducted a four-year study of high-tech startups founded by groups that include one or more PhD physicists
- Surveyed physicists who earned PhDs in the US between 1996 and 2001 and who were working in the US in 2010–11; nearly 1500 of them responded.
- Interviewed 129 of the 192 founders and 16 other company officers at 91 startups located in entrepreneurial clusters in 13 states.
- Of those 91 startups, 6 have gone out of business since we visited, 6 have launched initial public offerings, and 5 have been bought out.

Fields of physicist-entrepreneurs' endeavors

Field	Number of startups in study
Electronics/components	19
Medical devices and equipment	18
Instrument systems	12
Energy	9
Networking and equipment	9
Software	8
Consulting	4
Biotechnology	3
Contract R&D	3
Semiconductors	2
Computer equipment and peripherals	1
Data management and analysis	1
Intellectual property	1
Services	1

FROM ACADEME TO STARTUP TO MARKET

- Because the large high-tech companies (e.g. “Bell Labs”, “IBM”, …) that once supported significant research have switched to development, the role of **small startups as creators of innovative physics-based technology has become more important**.

- More than half of the MIT patents for really innovative, **early-stage technology are being licensed to startups**.

- Once a startup has **proven an innovative technology**, large companies will then buy either the product line or the company (as a conscious strategy for acquiring new technology and reducing risk.)

- **For a proven technology,** large companies sometimes pay 100 or even 1000 times what they would have paid had they licensed the same technology from a university at an early stage.

FOLLOW THE MONEY

- Funding is as critical in physics startups, and the sources of funding for physics startups have changed significantly since the late 1990s and early 2000s.

- Four different models: **venture capital**, **grants** from the Small Business Innovation Research (SBIR) or Small Business Technology Transfer (STTR) programs, **angel investors**, and **bootstrapping**. Companies typically use various combinations at different stages in their development, depending on both the availability and the perspectives of founders and funders.

- **One basic source of tension between physics entrepreneurs and venture capitalists is control over the amount of time allotted to go from proof of concept to a commercial product.**

  - Physicists typically want to i**nvest extra time in research to perfect a technology**, whereas venture capitalists want to obtain a profitable commercial product as soon as possible.

  - Physics entrepreneurs often seek to **maximize the long-term value of a technology**, but venture capitalists focus on maximum short-term return on investment.

  - **By accepting venture funding,** physicists give up significant control over their company and run the risk that the investors will cut off funding and close the business if deadlines aren't met.

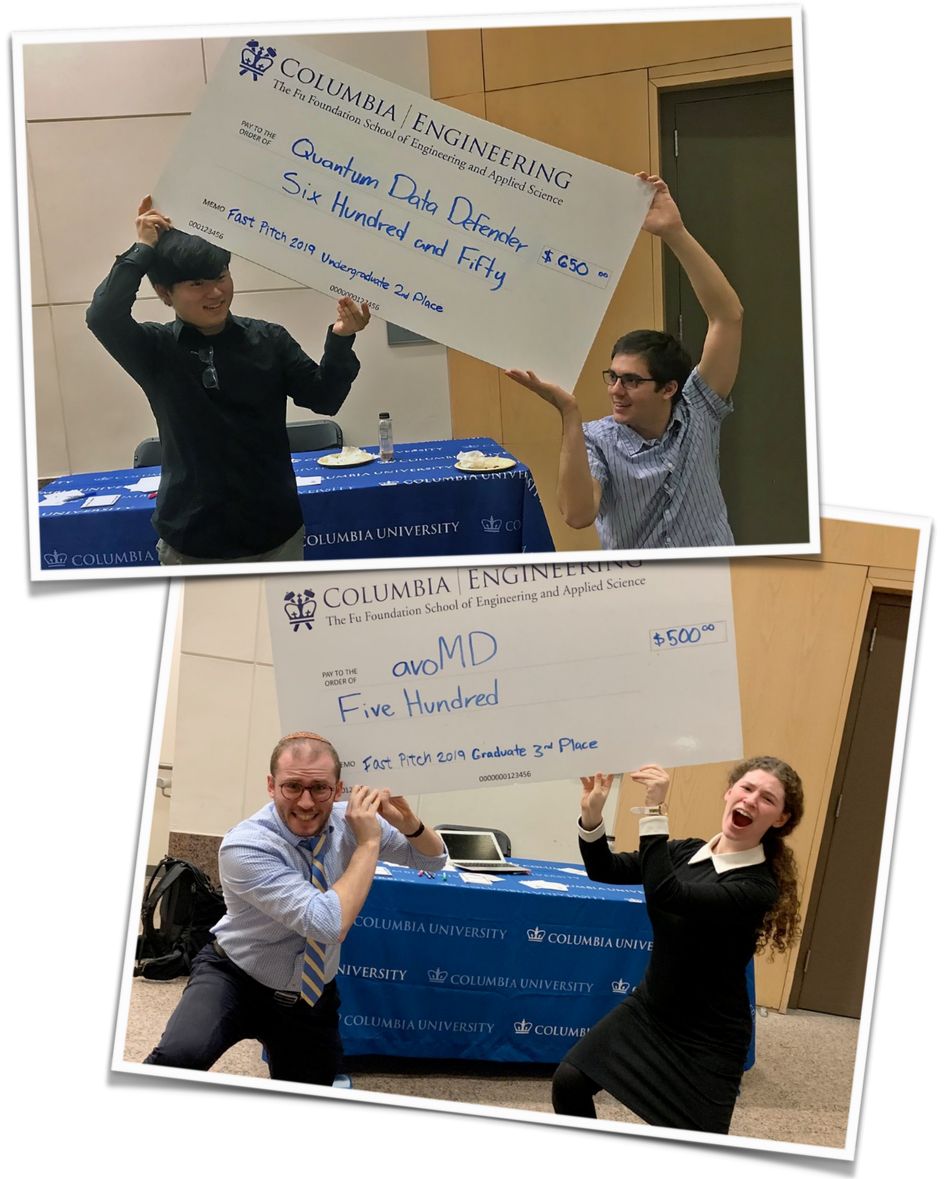
How to create an *unsuccessful* startup…

AIP study on physics entrepreneurship tried to “pull back the curtain” on a complex and volatile landscape to better understand trends and processes. They found no formulas for building or funding the next billion-dollar startup, but **avoiding the following pitfalls improves an entrepreneur’s chances for success**:

- Do not moving to venture capital funding too early, leaving inadequate time to develop the technology.
- Do not relying too heavily on federally funded Small Business Innovation Research or Small Business Technology Transfer Research grants and thereby moving too slowly to respond to the marketplace.
- Avoid depending on a “make the technology and they will come” approach instead of focusing on the potential market from the beginning.
- Do not delay bringing business expertise into the company.
- Do not insist on full control of the company; instead cede or at least share control as needed to develop a business strategy.

Columbia Fast Pitch Competition

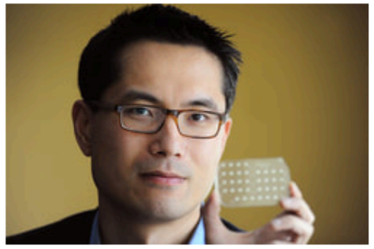
- 35 Teams (14 graduate-student; 21 undergraduate)
- 6 Judges (Rob Bibow, *CU MBA & Partner at Fission Ventures*; Michele Ritter, *CU JD/MBA*; Lucas Schuermann, *SEAS-CS & VP Engineering*; Hayley Netherton, *CU-MBA*; Maxwell Schilling, *CU-MBA*; Kamakshi Rao, *Harvard MS-Physics and Director at Ankur Capital*)
- AP Teams:
  - Quantum Data Defender (James Borovilas, Joseph Lee)
  - Drone Zone (Ari DeArriz Alexander Herron, Marco Miller, Issac Ruble, Xuxin Zhang)
  - HyperGlass (Unisue Divine, Zicheng Liu, Sunand Raghupathi)



Perfect Your Elevator Pitch

- **An “elevator” pitch is intended to be a concise, compelling introduction to your business. You should be able to slightly modify your elevator pitch depending on whether you are pitching to prospective investors, customers, employees, or partners.**
- Here are a few tips for developing and delivering a great elevator pitch:
  - Start out strong.
  - Be positive and enthusiastic in your delivery.
  - Remember that practice makes perfect.
  - Keep it to 60 seconds in length.
  - Avoid using industry jargon.
  - Convey why your business is unique.
  - Pitch the problem you are solving.
  - Invite participation or interruption by the listener—this shows they are interested and engaged.

CURRICULUM



Research to Revenue. A joint course (ENGI 4100), is being offered between SEAS and Columbia Business School. This course is centered around startups with intellectual property and will specifically cater to teams of engineering (advanced undergraduate and graduate) and MBA students. This course will be taught by Olivier Toubia (Glaubinger Professor of Business at Columbia Business School) and Sam Sia (Co-Director of SEAS Entrepreneurship Programs, Associate Professor of Biomedical Engineering and Founder of Harlem Biospace).

Learn more

Entrepreneurship Minor. This 15-credit interdisciplinary minor, which combines Columbia Engineering and Business School courses, is offered to Columbia Engineering students interested in creating and developing new technologies and associated business ventures. Click here to see the curriculum. Please direct any questions about the minor to Carmen Ng.

Learn more

Lean LaunchPad. LLP is a week-long intensive course that provides real world hand-on experience with starting a high-tech company. In this week, students go far beyond writing a business plan. This class is essentially a lab, taught by Steve Blank and Bob Dorf, that aims to create an entrepreneurial experience with all of the pressures and demands of the real world in an early stage startup. Students work in teams and use agile development to build something customers would actually use and buy. This course has a limited number of seats for undergraduate students, who must apply and be selected to participate.

Learn more

Careers in Physics

- Physics Jobs
- Becoming a Physicist
- Career Guidance
- Tools for Career Advisors
- Statistical Data
- Spectrum Playing Cards

Home | Careers In Physics

Careers In Physics

APS provides a gateway for physicists, students, and physics enthusiasts to information about physics jobs and careers. Find physics job listings, career advice, upcoming workshops and meetings, and career and job related resources.

▸ Visit the Physics Jobs Center

Innovation and Entrepreneurship in Physics

The majority of physics graduates will become scientists, innovators, and entrepreneurs in non-academic environments. APS joins in on nationwide efforts to promote experiences explicitly designed to better prepare students for 21st century careers, known as physics innovation and entrepreneurship (PIE) education. Visit the PIE homepage to learn more about these efforts including the APS PIPELINE program.
Physics Innovation and Entrepreneurship Education

Quick Links

- Find a Job
- Employer Information
- Students: Becoming a Physicist
- Career Advice
- Jobs at APS
- Committee on Careers & Professional Development (CCPD)

https://www.aps.org/careers/index.cfm