AIP|Matters

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Director's Matters

By H. Frederick Dylla, Executive Director & CEO

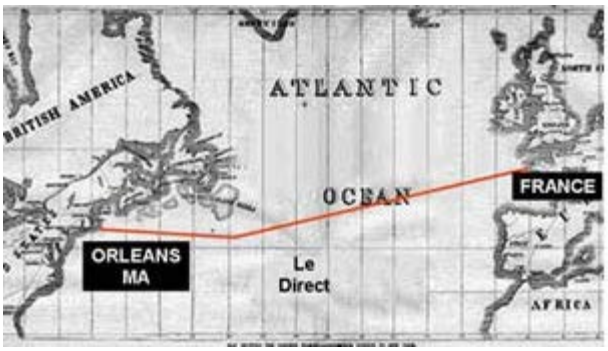
The French connection

With a tip of the hat to the telecommunications companies who strung the world with high-capacity fiber-optic cable a decade ago, anyone with a mobile phone can communicate nearly everywhere in the world with voice and data at a negligible cost. Those beyond their teen years can remember when the situation was quite different, and their parents can remember when a long-distance phone call—across the continent or across the world—was an expensive proposition. I was reminded how dramatically the accessibility of communications has changed in my lifetime during a visit to a small house-sized structure on Cape Cod. In the town of Orleans, MA, the French government built an end station for French transatlantic telegraph cables in the 1870s. This historical structure has since been turned into a museum and preserved for decades by a group of local citizens.

The story of the first transatlantic cables is generally well known because success took several tenacious attempts. American businessman Cyrus Field and the Atlantic Telegraph Company constructed the first cable from the Canadian province of Newfoundland to Ireland, and the heralded first official transmission came in 1858 from Queen Victoria of England to US President Buchanan. Before then, whether from head of state or citizen, all messages across the ocean had to be sent by boat—a minimum of 10 days. The telegraph took this down to 1.5 hours, when working optimally. The expense of this new infrastructure was $20 million; to put this into perspective, the United States purchased Alaska the following year for $7.2 million. And to transmit one word on this cable cost $10, more than a week's earnings for a typical laborer (Odlyzko, A., 2001). Think about that the next time you study your phone bill.

Communication was a greater commitment back then. Consider the care that senders took to compose these important and infrequent messages, and compare that with the hazards of today's instantly composed email or tweet.

The monopoly of transatlantic communications was held by the US-British enterprise, and this caused a problem for the French. For national pride, let alone sensitive business and diplomatic communications, the French needed their own cable. Over the period 1869-1879, the French laid cables from the coastal town of



Brest, on the small French-owned island of St. Pierre-Miquelon off of Newfoundland. In 1890, they routed a shorter cable down to the end station on Cape Cod for distribution across the burgeoning US telegraph network; they were finally able to send key messages, privately, to the banks in New York and embassies in Washington.

It's humbling to consider the technology required to send messages over those 3000-mile cables. The dots and dashes of Morse code were tapped out with telegraph keys that interrupted a battery voltage. There were no such things as electronic amplifiers. On land lines, weak signals could be interrupted and retransmitted with operators manning repeater stations. No such technology could be used on cable sunk to the bottom of the Atlantic Ocean. The solution to this problem could aptly be considered the first optoelectronics endeavor of all time, the progenitor of the semiconductor lasers that today transmit our messages across fiber-optic cables that traverse continents and oceans. The very weak electrical impulses sent via this French cable were transformed to deflections of light with a device called a galvanometer. The operator could record the duration or direction of the deflection as a Morse dot or dash. Can you imagine how tiring or prone to error such a task was? This led scientists to develop a recording device whereby the galvanometer dragged a minute glass fiber pen across a roll of paper. Now the message was archived and could be checked for errors.


The French Cable Station Museum, Orleans, MA

This sounds primitive compared to the technology that enables us to instant message today. It is remarkable to consider that this French cable station stayed in operation from 1890 until 1959, when the function was made obsolete by better technologies, including AT&T's transatlantic telephone cables. The first telephone cable in the series used 51 electronic repeaters (based on miniature vacuum tubes) and offered 36 channels for better, faster messaging across the ocean. Our present transatlantic calls and web traffic are now routed through fiber-optic cables. The first fiber-optic cable, the TAT-8, was commissioned in 1988; since then many more cables have been laid. The fiber optic cables that cross the Atlantic today deliver 10,000 times more information in one second than the French cables tied into Orleans delivered in nearly a century of operation.

See the OSA Member Society Spotlight below for another impressive example of speed of technological progress.

Darling, Warren, 1988. The French Cable Station Museum, Museum tour book. Orleans, MA: Lower Cape Publishing, 1988.

Odlyzko, Andrew. 2001. The history of communications and its implications for the Internet. *Computer Networks* 36:493-517. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=235283.

Inside Science's year-round internship program attracts top science-writing students

Ryder Diaz, Allison Jarrell, and Thomas Sumner are three recent *Inside Science* interns.

Inside Science's year-round internship program, launched in 2012, continues to flourish and experience success. Top graduate and undergraduate students from science-journalism programs across the country receive internship credits and portfolio-building clips while working with Inside Science editors on news articles and blog entries. The students work remotely from their schools and communicate with the Inside Science editors through a combination of Skype, phone calls, emails, and participation in *Inside Science*'s weekly editorial meetings.

Inside Science works closely with internship advisors and coordinators at science communications programs to ensure their students meet internship requirements and have a fulfilling experience. Inside Science has developed relationships with New York University and the University of California-Santa Cruz, which house two of the nation's top science communications graduate programs. In addition to these two schools, active recruitment efforts are also bringing in students from institutions such as Princeton, University of Wisconsin- Madison, and University of Georgia.

Following their time with *Inside Science*, two of these interns—Ryder Diaz and Thomas Sumner—have gone on to internships at AGU. Ryder's articles and Thomas's articles are available on the *Inside Science* website and have also been syndicated to news outlets including Fox and Scientific American. Last summer's intern, Allison Jarrell, has gone on to become a reporter and photographer at the *Capital Journal* in Pierre, SD. Among her recent coverage was a multimedia feature containing text, photographs, and video on South Dakota's Homestake mine, which is currently conducting searches for dark-matter particles.

The *Inside Science* internship program has become so well known in the science journalism community that interested writers are contacting *Inside Science* without being solicited by an ad or announcement. Several have completed the internship solely on a volunteer basis—they have no academic credit requirement—just to get valuable experience and clips. The internship is also proving to be of great interest to the *Inside Science* TV underwriters, whose science writing interns can have the opportunity to contribute approved pieces within the *Inside Science* editorial framework.

This fall, *Inside Science* welcomes a remote intern, Jyoti Madhusoodanan, from the UC Santa Cruz program. In addition, the program has an annual on-site internship. Amanda Alvarez is *Inside Science*'s full-time intern for six consecutive weeks through early October. She will be working mainly on researching and writing articles and blogs for the outlet. Amanda recently acquired her PhD in vision science at UC Berkeley and already has an impressive résumé in science writing, including a term at the

Milwaukee *Journal Sentinel* through an AAAS Mass Media Science and Engineering Fellowship. Please join us in welcoming Amanda to *Inside Science*!

Women among physics and astronomy faculty

The SRC recently published a report on women among physics and astronomy faculty members. Key findings are:

- The representation of women among physics faculty members continues to grow, reaching 14% in 2010.
- During the 2009-10 academic year, over one-fourth of the newly hired physics faculty were women, and women continued to be hired as assistant professors, as well as instructors and adjuncts, at well above their availability rate among doctoral recipients.
- About 15% of PhD-granting physics departments had five or more women among their faculty members.
- The representation of women among faculty members in astronomy departments (that do not also offer degrees in physics) continues to be higher than in physics departments. In 2010, 19% of faculty members in astronomy-only departments were women.

Percentage of Newly-Hired Physics Faculty Who Are Women

by Academic Rank	Year 2006	2008	2010
	(%)	(%)	(%)
Full Professor	9	10	20
Associate Professor	8	20	14
Assistant Professor	25	22	29
Instructor / Adjunct	23	23	24
OVERALL	**22**	**21**	**26**

The year in the table refers to the spring semester; for example, 2010 represents the 2009-10 academic year.

For details, please see the full report, *focus on Women among Physics & Astronomy Faculty* at the SRC website.

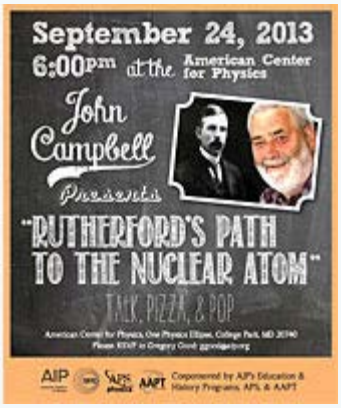
Member Society Spotlight

OSA offers glimpse at super-channels, transmitting terabits of data at record speed

OSA Corporate Associates hosts a webinar series designed for those interested in learning about advances in the optics industry. Last Thursday's webinar took a look at "High Speed DWDM Provisioning." DWDM is dense wavelength division multiplexing, an optical technology used to increase bandwidth over existing fiber-optic

networks. The webinar explains "how coherent DWDM super-channels allow service providers to provision multi-terabit capacity in just a few minutes, with only one engineer performing the procedure. [Speakers] discuss the importance of photonic integration in engineering these super-channels, and how the resulting implementation can be integrated with digital OTN switching and a generalized MPLS control plane to create a scalable, converged, and highly automated transport network architecture." See the OSA website for more details; the webinar will be archived and made free to the public early this week.

Coming Up



September 24

- Historian John Campbell of the University of Canterbury in New Zealand will give a talk, "Rutherford's Path to the Nuclear Atom," at 6 pm at ACP. (College Park)

September 25-26

- Individual counseling sessions with TIAA-CREF (College Park)

September 26

- Investment Advisory Committee meeting (Chicago, IL)

September 27

- ISTV Underwriters meeting (College Park, MD)

October 2

- ACP Blood Drive

October 6-10

- OSA 97th Annual Meeting & Exhibit (FiO) (Orlando, FL)

October 7

- Nobel Prize in Physics Celebration, an AIP Development event (Bethesda, MD)

October 8

- 2013 Nobel Prize in Physics announced