"Recruitment and Retention of Optics Faculty"

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ABSTRACT

There is widespread need for scientists and engineers educated in optics. Universities are beginning to respond to this need by creating new programs in optics and including more optics education in the context of existing programs. This situation presents challenges in recruiting and retention of faculty. This paper examines issues relevant to this challenge.

1. Introduction.

Like many other participants in this meeting, this was my first venture in giving a talk or writing a paper on a nontechnical subject. The topic was assigned to me by the conference organizers. The only qualification I bring to this task is to have been part of the building of three groups in optics, and witness to the demise of one strong university based optics center. My approach to the topic was to try to gather "data" on the subject then form some general conclusions. My attempt to gather data was via a questionnaire sent to various universities. The response to the questionnaire was sketchy at best. In some cases people thought the questionnaire to probing, other thought that they would be giving secrets to the competition and still others (the majority I think) simply ignored it as yet another piece of junk mail.

In most cases the returned questionnaires were only partially filled out, and in many cases it was obvious that the respondent had interpreted the questions differently than I had intended. In all cases the responses were unverifiable (Who knows, perhaps some of the competition deliberately misled me...?) Because of all this, much of what is presented here is a "case study" based upon my own recent experience.

The paper addresses the following topics: how to recruit, how to retain, where to recruit, problems unique to optics and a brief summary. "Data" is not presented in tabular form and without error bars. This was done to ensure that the reader not assign much confidence to the numbers.

2. How to Recruit?

In a word, ADVERTISE! It should be self-evident that, in order to recruit someone, that person must know about the position. In the Center for Research in Electro-Optics and Lasers (CREOL) at the University of Central Florida (UCF), we have advertised in the following journals and forums:

- o Optics News
- o Physics Today
- o IEEE Spectrum
- o SPIE Reports
- o Lasers and Optronics
- o Various national and international meetings
- o Recruiting talks (this one!)

Our experience has been that we have yet to hire a person through direct response to our adds. However, the adds spread the word and begin the networking process. By far the best way to recruit is by direct referral and "targeting" people of special interest.

In the past 18 months, we have hired 10 people in tenure track positions and an equal number of "soft money" people. We have an additional 14 tenure track positions available at all levels. The positions are fully funded by the State of Florida. Our target for the coming year is to hire a minimum of 5 new faculty. The targeted specialties include crystal growth and classical optics. In addition to fully funded, tenure earning positions, we offer competitive salaries, laboratory space, start-up funds, industrial interaction and an excellent quality of life with our mild climate, beaches, waterways and recreational opportunities.

A common problem in recruiting is that good people usually have good jobs at good places and at good salaries. That being the case, one need more than one kind of "currency" in recruiting faculty. We have found the following to be important:

1. An opportunity to excel in one's discipline.
2. Colleagues, i.e., critical mass of people in optics and related fields
3. First-class faculty citizenship, i.e., fully funded, tenure earning positions.
4. Lab space and start-up funds.
5. Realistic teaching loads.
6. Summer support.
7. Local industry in optics and lasers.
8. Salary.
9. Employment opportunity for one's spouse.
10. Quality of life.
11. Other...

Note that salary is fairly far down the list. It is absolutely necessary to pay competitive salaries but not sufficient. It is also unlikely that one can offer a high enough salary to "buy" a person.

3. Where to Recruit?

For optics faculty one can ask this question in several ways, i.e., from what disciplines, from what type of job, or from what geographic location. Optics is truly interdisciplinary. The survey (and my own experience) indicates that roughly 40% come from physics backgrounds, 30% from electrical engineering, 26% from optical sciences and the remaining 5% from other science and engineering fields.

As would be expected, the majority (60%) of optics faculty are hired from other universities, about 30% from industry, 5% from government labs and 5% from other sources. The university figures are somewhat biased since many faculty are hired upon completion of their Ph.D.'s or postdoctoral appointments and not recruited from among the faculty of other universities. From this it would seem clear that one should concentrate one's recruiting efforts at universities and industry.

The survey indicated that 74% of the optics faculty are U.S. citizens, 7% from the United Kingdom, 13% from the remainder of Western Europe and 6% from other countries. This distribution could change drastically in the future if the current trends in graduate enrollment in science and engineering in the U.S. does not change.

Indicative of the changing makeup of faculty is seen in the following distribution of 214 applicants for CREOL positions over the past year:

U.S. (or unknown)	40%
India	25%
China	10%
Eastern Europe	6%
Western Europe	5%
Iran	5%
Japan	4%
Others	4%

Of the 40% shown as U.S. or unknown, we can determine that about 15% are definitely citizens (half of these are naturalized immigrants). The international representation of optics faculty, and other science and engineering faculty, clearly enhance our universities. However, this does illustrate a disturbing trend among U.S. citizens to shun science and engineering. A nontrivial, practical problem is that the recruiters of optics faculty must become experts in U.S. immigration and naturalization policies.

4. Retention of Optics Faculty.

The job market for people educated in optics is very healthy. The availability of jobs in government and industry for optics faculty as well as openings at universities around the country makes the retention of optics faculty a difficult problem. The survey indicated that faculty who left universities took jobs as follows:

a.	Other universities	44%
b.	Industry	26%
c.	Retired	15%
d.	Government labs	5%
e.	Other	10%

A more interesting question is why did optics faculty choose to leave? The following is the result of a very informal survey, i.e., conversations with fellow "optikers" and interviews with perspective CREOL candidates. The reasons given are:

a. Change of career goals (e.g., took administrative position) 11%
b. Quality of life (e.g., climate or health factors) 11%
c. "Birds of a feather" syndrome 14%
d. Tenure opportunity 14%
e. Higher pay (not just salaries) 18%
f. "Fed up" or "PO'd" 36%

The last three reasons need further discussion and clarification. The "birds of a feather" syndrome refers to those optics faculty in universities without a concentration in optics, e.g., the lone faculty member in an electrical engineering or physics department. One might say that optikers seek the company of other optikers.

Item "d", tenure opportunity, refers to the fact that some universities have so-called "soft money" centers or institutes devoted to optics. The expectation in such cases is that the staff member bring in sponsored projects to pay their salaries. It is easier to recruit people in that situation than people in fully funded ("hard lines") tenure earning positions.

By far the most common reason given for leaving is that the person is fed up with their local administration. It is truly amazing how administrators at universities and sometimes managers at companies seem to drive away some of their most productive people. As a recruiter, I listen to the rumor mill for changes in management or administration. Often the new boss has a need to fix that which is not broke or change organization priorities. Such actions have been shown to lead to the demise of entire optics groups. If your university does not treat optics a an important subject, then expect to eventually loose your optics faculty.

Item "e", higher pay, does not just refer to salary. Often faculty will leave because of lack of support (space, equipment, research services, etc.) for their work. It is given that competitive salaries must be paid. However, faculty must be given opportunities to pursue their discipline. This means adequate laboratory facilities, fair support for their research and reasonable teaching loads. If you recruit a faculty member then deliver what was promised if you wish to retain that person.

In summary, the key to retention is as follows:

- o Deliver what is promised (labs, equipment, etc.).
- o Provide a good work environment.
- o Support optics as a discipline in your institution.
- o Provide fair rewards for high performance.
- o Most importantly, don't fix what's not broke!

5. Unique Problems in Recruitment and Retention of Optics Faculty.

Most of the previous discussion could be applied to the recruitment and retention of faculty in most disciplines. Special problems facing the recruiter of optics faculty include: (a) the interdisciplinary nature of optics; (b) competition with industry; and (c) limited supply of applicants with appropriate backgrounds.

The field of optics is inherently interdisciplinary and often involves such diverse elements as physics, electrical engineering, material science (a multidisciplinary field in itself), chemistry, mechanical engineering and mathematics. While many universities are becoming less and less structured along traditional discipline lines, many problems remain. Optics groups embedded in traditionally structured departments face the task of convincing their peers that a recruit is a "real engineer" or "real physicist" if that candidate does not have his or her degrees in those particular disciplines. I am particularly suspect, since I have degrees in Astronomy and Physics (B.S.), Physics (M.S.), and Electrical Engineering: Electro-Physics (Ph.D.).

As noted in Section 4, many optics faculty leave universities for industrial positions. This is a situation not faced by our university colleagues in many other fields. On the positive side of the ledger, about as many optics faculty are recruited from industry as are lost to industry. The availability of a strong job market in industry does present some problems. However, the flow of faculty to and from industry is, in my opinion, a healthy sign for the optics profession.

The biggest problem for both industry and universities is the limited supply of candidates with proper educational background and experience. There seems to be no end to applicants for faculty positions in optics (we have received over 200 in the past year). The problem is that most of these applicants lack education in optics and have only limited experience in optics. The large percentage of foreign applicants means that many do not have the command of English demanded in classroom teaching, citizenship required to interact with the aerospace industry, or proper visa status to enter the U.S. (although this can usually be solved with enough time and effort).

6. Conclusion.

The problems facing recruiters of optics faculty include high demand, limited supply, and the interdisciplinary nature of optics. The most fruitful areas in which to recruit are universities and industry. Among university faculty, good targets are schools with only isolated faculty in optics and schools undergoing administrative changes. The easiest, most straightforward thing to do to retain faculty is to follow through on promises (lab space, start-up funds, teaching loads, etc.). Most faculty leave because they get "PO'd" at some administrator because of failed promises, changing priorities, lack of appreciation of their worth, de-emphasis of optics or some other illogical administrative action. The rules of retention are straightforward. Ask yourself what would make you stay. Provide this to your faculty and they will stay. Usually management's biggest contribution is to foul the nest and screw things up! Spend your energy on recruiting, then get out of the way!