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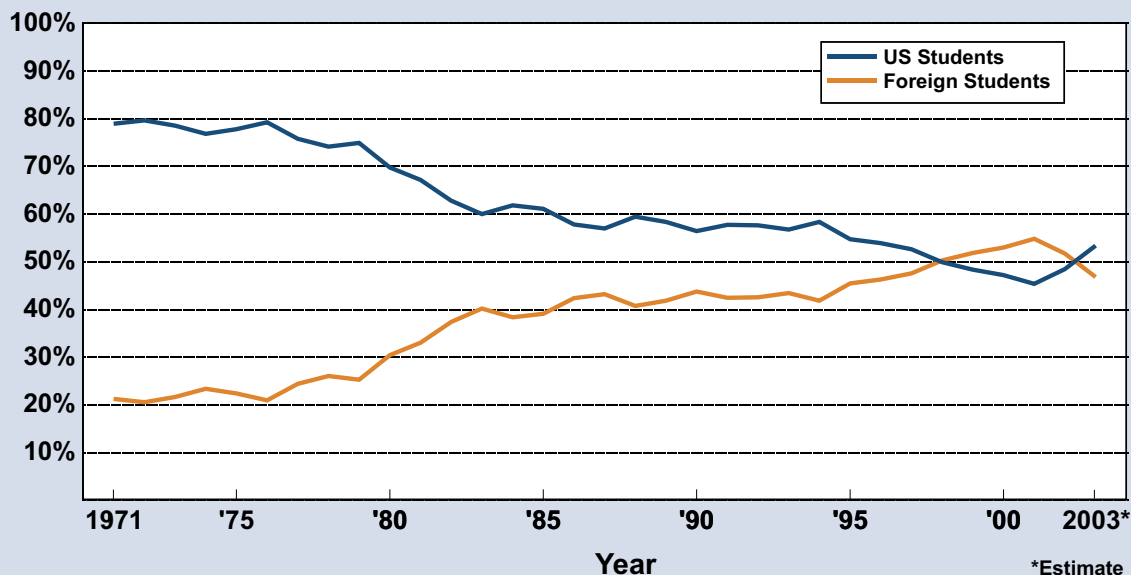
Physics Students From Abroad in the Post-9/11 Era

Highlights

- After decades of steady increases to a peak of 55% in 2000-01, the population of foreign students entering graduate physics programs has declined noticeably in the past two years.
- In the past year, two-thirds of the PhD-granting departments, and almost half of the Masters departments, report that they have accepted foreign students who were unable to attend because of visa difficulties.
- Overall, it appears that about 20% of admitted foreign students were at least initially prevented from attending in the fall of 2002. The highest-ranked PhD departments were least affected, but smaller PhD and Masters departments experienced a substantial enrollment impact.
- In numerical terms, Chinese students were by far the group most commonly denied entrance. Even in percentage terms, Chinese, along with middle eastern students, felt the greatest impact.
- Many departments report major effects on course enrollments, and on their ability to fill openings for RA's and especially TA's.
- Most departments are maintaining their current admissions policies for now, with only a few reporting major changes in their stance on accepting students from abroad.

Figure 1. Citizenship of First-Year Physics Graduate Students, 1971-2003.

Percent of Students



AIP Statistical Research Center: Graduate Student Surveys

Introduction

The United States has long thrived on the intellectual wealth of thousands of international students who flock here to pursue graduate studies in many fields. One of the fields that has benefitted most from this influx has been physics. Over the past thirty years, students from other countries have been an ever-growing presence in the graduate physics programs at our nation's universities. As tracked by AIP's Enrollments and Degrees Survey each year, the fraction of newly entering physics students who are not US citizens has grown from around a quarter in 1980 to more than a half two decades later, reaching a peak of 55% by the 2000-01 academic year (see **Figure 1**).

In the period between 1991 and 2001, enrollments of US citizens in physics graduate study dropped more-or-less steadily, and ended up more than a third below where they started. At the same time, the number of foreign students dipped only slightly, and then quickly recovered, and ended the period 7% higher than it began. This influx of foreign students helped to maintain the overall enrollment numbers to which physics graduate programs had become accustomed for many decades. Moreover, the impact did not end with graduation. The proportion of PhD degrees in physics awarded to non-citizens climbed in tandem, and while some of these new PhDs then returned home, many more stayed in this country and joined the ranks

of professional physicists, continuing their careers as post-docs and working scientists.

We first started hearing stories of international students, including physics graduate students, running into greater difficulty when first trying to enter the country, or when re-entering after traveling abroad, soon after the attacks on the World Trade Center and the Pentagon in September of 2001. At first, the only indications were anecdotal, but in our most recent surveys of student enrollments in US physics programs, covering the 2001-02 and 2002-03 academic years, findings emerged that could well be related to this issue – most notably, two consecutive decreases in the number of foreign citizens among entering physics students, the first such declines in many years. The cumulative decline was a surprising 10%, only 3% in the first year but swelling to an estimated 7% for 2002-03.

Concerned about the impact in physics, AIP's Statistical Research Center conducted a small, targeted survey early in the first half of 2003 covering all physics graduate programs across the country. Responses were received from 72% of all departments, including 76% of the 185 programs that granted PhDs in physics and 64% of the 69 programs that offered a masters in physics as their highest degree. The data from that study

were then linked to our database of information on each program's enrollments and degrees that we collect every year. **Table 1** provides a snapshot of the composition of physics graduate programs and the wide variation in relative size for four categories of departments: those ranked in the top quartile on the National Research Council's most recent ranking of physics doctorate programs (36); all other physics doctorate programs at schools rated Research-Extensive on the 2000 Carnegie Foundation Classification of Institutions of Higher Education (106); all physics doctorate programs at the generally smaller schools rated Research-Intensive in the Carnegie Classification (37), plus 6

schools with miscellaneous Carnegie ratings; and all programs granting the physics masters as their highest degree (69).

Are applications from overseas drying up?

Applications from international students remain widespread, relatively stable and considerable in number. Virtually every department queried reported receiving applications from abroad, with a reported average of 85 per year and a median of 50. More than half of the responding departments said the number had been stable over the previous two years, and,

Table 1. Enrollment Characteristics of Graduate Physics Departments, Fall 2002.

	Top Ranked Physics Departments Among Schools Rated PhD-Extensive in Carnegie Classifications	Other Physics Doctorate Departments at Schools Rated PhD- Extensive in Carnegie Classifications	Physics Doctorate Departments at Schools Ranked PhD-Intensive in Carnegie Classifications	Physics Masters- Granting Departments
Number of Departments	36	106	37	69
Number of Responding Departments	28	90	23	46
Total Number of Physics Graduate Students at Responding Departments	3,862	4,655	544	444
Average Number of Physics Graduate Students Per Department	138	52	24	10
Average Number of First Year Graduate Students	29	13	5	3

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among the others, more reported increases than decreases.

It is important to note that there is tremendous variation from department to department in the number of applications – 29% of the departments received applications from fewer than 20 foreign students, while at the other extreme 17% reported more than 200 such applications last year. **Table 2** shows the uneven distribution of applications from abroad by type of department, along with the data on the numbers finally admitted and their relative weight in programs in each category. What stands out most in the table is that while the higher-ranked departments tend on average to get a far greater number of applications, both

applications and admissions turn out to be relatively evenly distributed once department size is taken into account. Here is clear evidence that, in percentage terms, international students have become an integral part of graduate physics education at all levels.

How common are the visa problems for entering students?

While **Table 2** illustrates the abundance of applications from abroad, **Table 3** shows the extent of foreign students experiencing visa problems. Here, we focused directly on the most serious problems, asking departments to tell us only about students who had been accepted into the graduate program, but

Table 2. International Student Presence at Graduate Physics Departments, Fall 2002.

	Top Ranked Physics Departments Among Schools Rated PhD-Extensive in Carnegie Classifications	Other Physics Doctorate Departments at Schools Rated PhD-Extensive in Carnegie Classifications	Physics Doctorate Departments at Schools Ranked PhD-Intensive in Carnegie Classifications	Physics Masters-Granting Departments
Number of Applications From Non-US-Citizens	6,736	7,133	977	503
Average Number of Applications From Non-Citizens	241	80	42	11
Average Number of Non-Citizens Enrolling as First Year Students	13	7	2	1.4
% of Non-Citizens Among First Year Students	45	53	40	43

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who were then prevented from entering the United States by the time of the survey.

Overall, two-thirds of the PhD-granting physics departments, and almost half of the Masters departments, reported having had students who were granted admission but who were then prevented from coming during the Spring 2002 or Fall 2002 terms, with around two-thirds of these departments reporting multiple instances of such cases. But when we break down these reported difficulties by type of department, as shown in **Table 3**, it

becomes evident that the distribution is uneven in a different way than encountered above. In general, the lower-ranked graduate departments report a greater proportion of newly admitted foreign students experiencing visa problems, and they also report a greater fall-off in recent applications from this group.

Which students are most affected?

While this phenomenon was not unknown in earlier years, it has definitely worsened

Table 3. Number and Trend of Visa Problems and Trends in International Applications, Fall 2002.

	Top Ranked Physics Departments Among Schools Rated PhD-Extensive in Carnegie Classifications	Other Physics Doctorate Departments at Schools Rated PhD-Extensive in Carnegie Classifications	Physics Doctorate Departments at Schools Ranked PhD-Intensive in Carnegie Classifications	Physics Masters- Granting Departments
% of Departments with Accepted International Students Denied Entry	64	76	39	46
Average Number of Accepted International Students Denied Entry	1.4	1.9	0.7	1.0
Denials as a % of Total Non-Citizens Accepted	10%	22%	25%	40%
Reported Change % Increase in Visa Problems % Stable Over Past 2 Years % Decrease	67 22 11	73 24 3	89 0 11	57 38 5
Reported Change % Increase in Overseas Apps. % Stable Over Past 2 Years % Decrease	46 50 4	32 51 16	22 61 17	4 59 39

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in the post-9/11 era, in the view of almost three-fourths of the PhD programs and half the masters programs. This made it all the more surprising that the increased vigilance seemed to be a product of a more broadly applied tightening of the regulations governing immigration and visa-granting, rather than a particular targeting of students from countries viewed as harboring groups antagonistic to the US. For example, when asked whether the visa problems “were isolated to certain countries of origin,” 72% of the respondents said yes, but then two-thirds of these cited China, compared with 15% mentioning predominantly Muslim or Middle-Eastern nations—mostly Iran. The frequent mention of China is not surprising given that this is still the country that supplies the most foreign graduate students (25% of incoming foreign students in 1999 and 2000 combined), but the fact that the percentage of mentions was so large and disproportionate reinforces the conclusion that the focus of the rule changes is not simply the Middle East.

We could find no disproportional impact by subfield, suggesting that students focusing on what are deemed “sensitive” areas of physics from a security standpoint are not any more vulnerable to such problems than students studying other topics.

It is not easy to get an accurate sense of the extent of the difficulties from the student perspective, in part because those refused

entry are not here to be surveyed. However, by comparing the number of visa denials reported by departments with the number of foreign students who entered the affected programs in the same year, we come up with an overall estimate that about a fifth of foreign applicants who were accepted and scheduled to enter the US during 2002 were denied entry into the US. Of course, some of these students may reapply and eventually gain entrance to the US and to the physics program into which they were accepted. Nevertheless, the fraction affected is substantial, and the impact will disrupt not only the plans of the affected students, but also the planning of many graduate physics programs in this country.

What is the impact on physics departments?

It is not surprising that the bigger departments are more likely to report at least one instance of an accepted foreign student being denied entry to the US, although nearly all the Masters departments, smallest of all on average, reported at least some visa difficulties. What is more surprising is that when we quantified the impact, we found that the picture actually reversed. While the largest departments had by far the largest absolute number of students denied entry, when we looked at denials in terms of the proportion of international students affected, the smaller departments tended to suffer the greatest impact. Moreover, with fewer students, they probably had

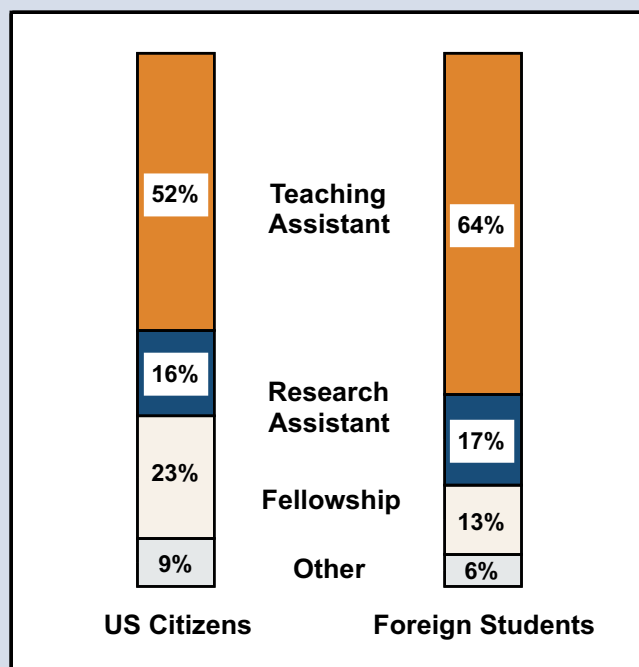
less opportunity to compensate in the short run by reassigning the tasks of those who did make it in.

Other implications for departments emerged in the open-ended responses and comments which were offered by virtually all the department chairs. A large number of responders indicated that the biggest impact is on filling Teaching Assistant and Lab Assistant slots for undergraduate courses. This is not surprising, given that TA's are traditionally assigned to first-year graduate students (see **Figure 2**). Many departments talked about having to recruit TA's from among grad students in other programs or advanced physics

undergrads, with some pointedly noting that the quality of teaching had suffered as a result. Other frequently mentioned impacts to the departments include Research Assistant slots unfilled and low enrollments in graduate courses, causing some course cancellations. Some responders also voiced fears that, in the current environment of budgetary stringency, any TA slots left temporarily unfilled would be yanked by the administration and permanently lost to the program.

Additional perspective on the situation emerges from the comments made by respondents. On the positive side, a

Figure 2. Sources of Support for First Year Physics Students by Citizenship, 1999, 2000 & 2001.



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number of chairs reported that some students who were initially unable to enter the US in the fall were finally cleared for entry months later. While this still caused great disruption to department and student plans, and often considerable distress to both parties, it was not as damaging in the long run as cases where students were simply denied entry with no redress. However, many chairs complained that the effort to get students through immigration caused a substantial drain on the time and resources of both faculty and administration. While this was not the focus of the study, many departments also reported in their comments that a number of continuing graduate students who had left the country for vacation, conferences, or family emergencies were at least initially, and often permanently, prevented from re-entering this country. Several complained that this was even more damaging to students and the program than the difficulties faced by new graduate students, because it led to greater disruption of ongoing work and living arrangements, and, in the worst cases, resulted in derailed careers and years of wasted effort on the part of all involved.

The comments also afforded a better sense of the specific changes in the pattern of applications from abroad, and the tremendous variation from campus to campus. In terms of country of origin, China predictably gets by far the most mentions – almost half of the total – but, significantly, many more of these report decreases rather than increases in

applications from China in the last year or two. The next most frequently mentioned country is India, where the opposite holds, with twice as many schools saying applications have increased as have decreased. In third place are the former Soviet-Bloc countries, where roughly the same number of programs report changes up and down. Oddly, and completely unexpectedly, fourth place is occupied by Nepal, a country with a population that is only a tiny fraction of the first three examples (around 2% of China's and India's, and perhaps 7% of the countries making up the former Soviet Bloc) and where every mention involves an increase in applications. No ready explanation for this finding has surfaced, although it may involve nothing more than a handful of applicants blanketing American physics programs with applications. The advent of online applications and the waiving of application fees by certain programs have made this more of a possibility.

How are departments responding to the situation?

Finally, the survey asked each department to describe how it was coping with the difficulties caused by the increasing problems with foreign student visas. What is most interesting is that programs often offered similar reasons to explain why they responded in opposite ways. Among departments who reported having international students who were prevented from attending, 65% said they were not changing any of their admissions policies

as a result. Another 15% said they never took citizenship status into account in admissions decisions, either before visa denials became more common or now. But 10% of the departments said they had decided to admit fewer international students than they had two years ago, with some explaining in their comments that the intention was to insulate themselves from the associated problems and uncertainty. Another 9% took the exact opposite tack, choosing to admit a greater

number of non-citizens than they previously had, with some commenting that their reason was to offset what they expected to be a lower proportion of those students actually making it than had previously been the case.

Many thanks are owed to Megan Henly, Mark McFarling and Starr Nicholson of the AIP Statistical Research Center for the rapid and adept data collection and analysis efforts that underpin this study.

Verbatim Comments From Departments Reporting Visa Problems

How have the visa problems that international students have been experiencing affected your department?

*Redistribution of students teaching labs, occasionally using undergrad assistants to facilitate teaching. Sometimes canceling a lab because of lack of instructors.

*We had to make alternative arrangements to meet our TA needs and recruit more students this year.

*Only minor

*Until 3-4 years ago, we expected International students to be in our programs ready to start in August when they accepted offers either in the spring or summer. That is no longer true. Offers to International students will be placed earlier.

*Since our entering class is typically 20, a loss of 6 students has had a major negative impact on course enrollments, Teaching Assistantships, and competition for research students.

*Our incoming class was significantly reduced. Existing students have greater teaching responsibilities to compensate.

*This reduced the size of our first year class and left us short of teaching assistants this year.

*We have had to admit students who are already in this country.

*No real impact so far. Student was accepted, ended up not coming due to visa problems.

*3 out of our 10 foreign students weren't able to enroll for fall. It caused us lots of extra work in sending letters to US

Consulates, and making other administrative arrangements when they couldn't come. Finally one was approved and came in Winter, but the other two were denied completely from the Beijing Consulate. We hope they can make it here next fall.

*Four of the best incoming physics students from China.

*None as far as I know. We received 8 to 10 more acceptances than we were anticipating. So, the fact that one student could not come to our department has had no impact whatsoever.

*These students had two-year fellowships. We lost the fellowships.

*The student arrived two weeks late. Our major impact has been to try and move the graduate admissions process forward.

*We only admit a small number of the very best foreign students. Our research program is negatively impacted when they are not able to come.

*It made planning a bit more difficult, but we compensated by dipping into our wait list.

*Fortunately we were able to locate qualified students to fill the vacant RA positions that these students were unable to occupy.

*Significant. Two out of 6-8 is a significant proportion. We have had to look outside the department to staff our labs.

- *The 2 students who didn't arrive September 2002 had little impact on our program this year. But international applications were down for 2002 and have dropped again so far for 2003. The long term affects could be quite serious if the pattern continues.
- *We were short one TA (out of six) and the research groups will not have enough students in two years.
- *We lost one expected graduate student.
- *This particular student (from India) was offered a teaching assistantship (TA). He informed us in July that his visa application was rejected. This happened so late in the year that we were unable to fill this empty TA slot last fall. This impacted teaching of our elementary physics labs. Finally, we were able to find a number of undergraduates to cover the sections that were originally assigned to the aforementioned graduate TA.
- *Little impact—we had to find two other Teaching Assistants.
- *Shortage of TA's in fall—hired Physics majors (undergrads) instead. Only one of six eventually got his visa and came this semester. Also lost one TA this semester when a current student returned to China and has not yet been given a visa to return.
- *The visa was delayed, and he entered 3.5 months later than the rest of his classmates. Other than this one case, no impact.
- *The student missed a whole semester and the appointment had to be redone.
- *We are unsure of number of international students to accept—not sure if visa problems will prevent students from entering the country.
- *The Space Physics group lost their best candidate and were not able to fill that position at all.
- *What we are requiring overseas students to do this year is to accept or deny us on a very short time frame. Three weeks after they receive the e-mail offer. The reason is that it took last year on average 6 months for the students to get their student visa whereas it previously took only two months.
- *Caused concern.
- *N/A
- *Not at all.
- *Time and effort. However, the lack of one additional graduate student was not a problem.
- *We had to try to find replacements at the last minute, which is not always possible, and will be impossible now with the extra security requirements. (We will have fewer lab assistants to teach the labs, that means fewer lab sections.)
- *We have fewer grad students than we need to keep a robust graduate program going. We have undergrads and temps teaching labs which should be grad student based.
- *Two research groups were short of the normal contingent of graduate students.
- *Students were not able to take advantage of the scheduled English Language Program in August. The students were impacted more than the department.
- *The student had to begin his graduate program a semester late.
- *We had fewer students than hoped.
- *Yes, harder to get students.
- *Every year, we anticipate that some students will run into VISA problems. It does not generally pose a big problem for us.
- *We had to offer assistantships to less qualified students.
- *Reduced the size of the entering graduate class and required hiring additional teaching assistants from departments outside of Physics.
- *Some of the students were coming as RA's and the professors who had hired them were unable to fill the positions by the time they learned that the students would not be able to come. We were also left with unfilled TA positions and had to find substitutes at the last minute.
- *When a student is expected to matriculate, and then is unable to join the department, it directly impacts our TA pool.
- *Fewer international grad students.
- *No significant impact yet. We had a much larger fraction of the students accept our offer than previous years, so we still had more first-year grad students than in the past.
- *Loss of quality students.
- *This represented 40% of our incoming class, with immediate impact on filling teaching assistant positions (and classes) and long-range implications on our research. (Two of these individuals eventually got visas and plan to come later.)
- *The impact was minimal and the student began his visa application late. But it may also have been affected by the current situation. Note - in question 1b, since we only had one student affected it was by definition limited to a certain country. Again it may or may not have been related to 9/11.

- *We ended up with less students in the first year program, and ultimately less students taking the introductory first-year physics class.
- *We don't have enough TA's to staff our undergraduate programs.
- *There has been no adverse impact yet.
- *We held his assistantship for him until we knew for sure he was not coming. We may have accepted someone else if we knew he was not able to come.
- *There has not been a big impact on us, yet.
- *Minimal impact.
- *Some research groups (especially in nuclear physics) have not been able to fill all their graduate research assistantship positions.
- *This is bad from several points of view: (1) by the time the visa application has been declined, it is too late to make a further admissions offer (2) we are consuming a great deal of time, energy and effort in trying to get visas for some students that we admit (3) responses from the State Department-consular officials are variously idiotic, meaningless, vague, and-or insulting and show a complete absence of understanding of the physics discipline(s). For example: atomic physics is routinely confused with nuclear physics.
- *We had to get less qualified TA's from engineer departments.
- *No major change.
- *Not at all.
- *The troubles with getting visas in China last year has forced us to consider accepting fewer applicants from China this year.
- *No impact.
- *We are compelled to accept more students with less strong credentials into our MS and PhD programs.
- *Only one student was denied a visa, but two more were unable to come until January. So far it is O.K., but we are worried about this upcoming year.
- *Not much.
- *Potential loss of a highly qualified graduate student and teaching assistant
- *Minor impact on the department, bigger impact on the affected students.
- *Two students were able to arrive for spring 2003 while two students from China have been denied visas for fall 2002 and spring 2003.
- *Could not hire student for RA. PI is miffed. I am miffed. Taxpayers should be miffed.
- *Research labs were counting on them.
- *One does not an impact make.
- *We got less graduate students than we planned.
- *Both students received teaching assistantships which did cause us to be short.
- *Not much.
- *It impacted us negatively.
- *The student from Iran was unable to come at all. The two students from China were able to come for the Spring 2003 term. Since we do not offer every class every semester, this can throw some students off their courses of study by a semester.
- *Very little.
- *Decreased enrollment and increased difficulty staffing labs.
- *As we have had a fairly healthy improvement both in terms of the quality and quantity of our graduate student population in recent years, our program is not as severely impacted. However, the uncertainty in Visa situation may lead to hardship if the difficulty remains for a period of another one to two years.
- *It will wipe out our grad program if it continues.
- *Mainly, it has forced sudden changes in staffing undergraduate labs. We have been able to cover, but the coming year will be more troublesome.
- *We'd like the students to be here and they're not!
- *No real negative impact. Basically only administrative additional work.
- *We had to make offers to other students.
- *The 3 PRC students had been offered Teaching Assistantships for Fall 2002. When it became apparent that they would not be allowed into the U.S., we had to make last minute arrangements to fill their positions. This situation makes it difficult to plan and staff our undergraduate courses.
- *In this particular year, it was not a problem because an unusually large fraction of our admits accepted our offers, so we were relieved to have three fewer mouths to feed. But in general, it is a disaster to have this happen. These are students that we wanted to come, and we were planning on having them. It was also a serious administrative burden for our department and our foreign student office to counsel them, write letters to the embassy, etc.

- *Our department is small. We have 3-5 graduate students at a time. Losing one international though has a negative impact on us.
- *One student arrived one semester late, the other student did not come here at all.
- *Yes. We usually support incoming students as teaching assistants. When visas are denied at the last minute, we need to find short-term replacements, and the graduate assistantship becomes unavailable to another long-term student until the visa situation is resolved.
- *Greatly reduced enrollments in graduate courses (40-50%) and strained our staffing resources for both TA's and RA's.
- *Very little impact.
- *Qualified students could not enter, this impacts our research program.
- *It has taken a great deal of time to work with the embassy. We have spent Department funds to send multiple correspondence by fax to the embassy. Also, the department paid the student's application fee with the student agreeing to reimburse the department upon arrival into the U.S.
- *Two teaching assistant positions went unfilled at the last minute, creating difficulties in staffing laboratory sections. Also one research project was delayed because two students arrived in the fall who were originally scheduled to come for the summer.
- *We plan on supporting a certain number of students and if these don't arrive, other students who could have used the funds go unsupported due to timing. In addition, we have assistantship positions we have to rearrange students schedules to fill.
- *Minimally.
- *Shortage of qualified graduate students
- *No impact.
- *We are short of TA's and have been unable to open labs in response to demand. We may lose unused Assistantships.
- *With a typical entering class of ~5 students, having one denied entry is a significant perturbation -- smaller classes, fewer TA's, less of a first-year-student community.
- *It hasn't.
- *Loss of good graduate student and role model
- *Actually, we've been able to absorb the impact because we had a larger than usual acceptance rate last year.
- *The student was ABD, and had gone home to China to get married. His plan was to bring his wife back with him to finish his Ph.D. When he tried to re-enter the U.S. his visa was denied. His research was impacted and his major advisor was one student short in her laboratory. It took several months for him to have his visa reissued. He has since returned, spring 2003 and has resumed his Ph.D. work. His wife is still in China.
- *It has resulted in a shortage of teaching assistants.
- *We deferred these two Chinese students to Spring Quarter 2003. I express mailed their I-20 forms today. We will now have to wait to find out if the consulate okays their visas. Although minor, the delay impacts our plans for target enrollments and distribution of support monies.
- *This has severely impacted our graduate program as we will have fewer students available to perform research in our nationally funded research programs. Also this lack of graduate students has had a negative impact within our University as the University is considering a reduction in the budget of the departments with decreasing graduate student enrollments. This is especially critical to physics as the enrollment of physics grad students is already low in comparison to other physical and life sciences.
- *More wary of depending on all the admitted international students arriving. We are admitting more hoping that some get through.
- *This situation has resulted in fewer students entering than had been accepted. It has also resulted in the inability to accept domestic students who would not have faced visa problems.
- *This has adversely affected our department. We presently cannot offer as many advanced courses, since the student population to attend those courses is greatly reduced, increasing the time frame over which students must attend classes concerning their expertise. In addition, many teaching assistant positions are being covered by advanced graduate students (who should be focusing on their research) and by advanced undergraduate students. The faculty have been extremely successful in garnering funding, but the personnel for the research assistantships does not exist. This will adversely impact the quality and quantity of the research that can be accomplished by the faculty.
- *Not at all.
- *Two students who were already here had trouble returning from trips home (Russia and People's Republic of China).