"Climate for Women" Site Visit Report
Department of Physics
University of Maryland
April 25, 2001

I. **Introduction**

The Committee on the Status of Women in Physics (CSWP) received an invitation to investigate the climate for women in the Department of Physics of the University of Maryland from Professor Jordan Goodman, Chair of the Department. In response to this request, the CSWP assembled a team consisting of Beverly K. Berger, a theoretical gravitational physicist from Oakland University (Chair), Gail Hanson, a high energy experimentalist from Indiana University, Kate Kirby, an atomic physicist from Harvard-Smithsonian Center for Astrophysics, Laurie McNeil, a condensed matter experimentalist from the University of North Carolina, and Lillian C. McDermott, a physicist, whose research is on the teaching and learning of physics, from the University of Washington.

Prior to our visit, we were provided with statistical information about the department and university and department policies of concern to women. We also received the results of a student satisfaction survey administered to graduate and undergraduate students.

The visit took place on February 22, 2001. The team met initially with Prof. Goodman and his associate chairs, Professors Frederick Wellstood (undergraduate education), Nicholas Chant (graduate education), and Andrew Baden (facilities and personnel). We met with Dean Stephen Halperin of the College of Computer, Mathematical and Physical Sciences. We also met with undergraduate, graduate, and postdoctoral women, with all four (one by telephone) women faculty, with a small group of male faculty, and with a group of those in charge of advising. Finally, we had an exit interview with Prof. Goodman.

II. **Findings and Recommendations**

A. *Review of the first CSWP site visit*

In April 1990, the first CSWP Site Visit was made at the University of Maryland. That team (Mildred Dresselhaus, Lillian C. McDermott, Elaine Oran, Miriam Forman, Luz Martinez-Miranda, Judy Franz) made two major recommendations — that the Department hire additional outstanding women faculty (Ellen Williams was the only one at that time) and that the Department revise its qualifying examination to reduce unnecessary hurdles --- such as the need for students who passed the written test to also take an oral exam. The team also noticed that the undergraduate women were excited by their studies and very positive toward physics. In response to "minor" complaints, the team suggested that the Department revise its undergraduate laboratories, encourage any professors who were negative and discouraging toward undergraduates to be more supportive, and to make sure that TAs can speak English adequately. The graduate students were less forthcoming and more reserved than the undergraduates. The team recommended that the Department consider a mechanism, such as pizza parties, to bring the women together in an organized way.

B. *Overview from this visit*

The committee found that overall the climate for women in the Physics Department was very supportive. Despite the size of the Department (approximately 70 tenure track faculty and 170 graduate students), there was general agreement that the Department was congenial and helpful.

Several of the most important concerns of the original site visit team have been addressed successfully. The Department has hired additional outstanding women faculty and modified its qualifying examination to make it more humane. Undergraduate laboratories have been revised. On the other hand, concerns about discouraging professors, difficulties with non-native English speaking TAs, and a lack of community among female graduate students arose during this visit.

Dean Halperin regards the climate for women in physics as part of the larger issue of bringing minorities into science. He believes that physics has not yet made a cultural transformation like that which has greatly increased the numbers of women in other scientific fields. He is very impressed with the Physics Department and its efforts in the area of diversity and the sincerity of the Chair in promoting such efforts. He says that it is easier to obtain resources to improve a department if the improvement will increase diversity.

Dean Halperin sees the Department as having grown in the past two years and does not anticipate additional new positions. (The alleged growth includes the positions associated with the Phillips group. The number of tenure track faculty has actually declined from 80 to 73 since the early 1990s.) The Dean is willing to support "target of opportunity" hires of women (subject to the existence of potential collaborators) by mortgaging future retirements. He has been pro-active in assisting in the solution of spousal employment problems.

Several college and university-wide initiatives support a positive climate for women as part of the University's status as the most diverse major research university. These include

- the requirement that every department submit an annual diversity report describing ongoing efforts to increase diversity;
- college and university resources are available for programs aimed at increasing diversity;
- extra support for faculty hires that would increase the representation of women and minorities is available;
- university wide cooperation to solve spousal employment problems is in place.

Several Department initiatives and structures have improved the climate for women. These include

- the hire of 3 outstanding women faculty (in addition to the existing single faculty member who is now Distinguished University Professor) since 1991;
- involvement of the entire faculty in hiring decisions allows new faculty to arrive with a broad basis of support;
- involvement of the entire faculty in tenure and promotion decisions has yielded a 100% success rate in tenuring women faculty;
- a policy that new hires should always be part of a group has greatly enhanced the prospects for success of new faculty;
- the staff (non-faculty) position of undergraduate advisor has improved the effectiveness of advising at this level.

Prof. Goodman expressed several concerns, especially the need to institutionalize a positive climate for women (and for everyone) so that it could grow independent of the identity of the Chair.

In its discussions, the Team identified a number of areas where improvements could be made. These, with our recommendations, will be discussed below.

C. *Women faculty*

The committee met with three women faculty members: Ellen Williams, Betsy Beise, and Melanie Becker, with Sarah Eno joining in by conference telephone. Ellen Williams is a Distinguished University Professor and Director of the Materials Research Science and Engineering Center. Betsy Beise is an Associate Professor in experimental nuclear physics. Sarah Eno is an Associate Professor in experimental high energy physics. Melanie Becker is a newly hired Assistant Professor in theoretical particle physics. At the site visit ten years ago there was only one woman faculty member — Ellen Williams.

One issue discussed was the large load of service responsibilities that women faculty are expected to handle. This might make unrealistic the idea of matching women undergraduates in physics to women faculty members as advisors, since the representation of women among the undergraduates is larger than among the faculty. This is especially true if the women faculty organize the twice a year pizza lunch with undergraduate and graduate students.

Overall the women said that the male faculty members are accepting of women faculty. All faculty hires are decided in meetings of the entire faculty, who vote on the initial offer and package. Prof. Eno recently had a baby, which she did using a sabbatical and sick leave, so that she didn't have to teach for a year. She said that she did not have any problem with male faculty members during the pregnancy. There is evidently no paid maternity leave.

Prof. Beise mentioned that seven years ago when she was hired she had a problem with her spouse finding a job in the area. Initially the Physics Department did not help, and she was given only one month to decide whether or not to accept the offer. Lacking opportunities for her spouse, she chose to decline the offer. Not long thereafter, her spouse found a position in the area, and the physics department reopened the offer. She also mentioned that the Dean's new policy regarding sabbaticals (insisting on one year at half-pay rather than allowing the option of six months at full pay) was more difficult for professional couples.

When asked what changes they would like to see, it is interesting that the women's comments were focused on the needs of students. The undergraduate students need a good place to meet, study, etc. The teaching assistant offices need improving. There should be books addressing positive attitudes for women physicists and links to web sites featuring women physicists. They also mentioned that there should be more women speakers invited to give departmental colloquia.

The discussions with the female faculty members did not bring up any particularly negative issues, and it seems that their situation is a positive one. Four thriving female faculty members in a department as highly regarded as that at the University of Maryland is an unusual situation, although the department is very large. There are efforts from the President of the University on down to recruit senior and first-rate female faculty members.

<u>Recommendations</u>:

1. The Department's success in creating such a positive climate for 4 outstanding women faculty strongly implies that they should work to recruit more women. A critical mass (say 10% of the tenure track faculty) of women faculty would greatly contribute to the institutionalizing of the positive climate.

2. The Department should take care that the women faculty not be overburdened with service responsibilities and that these responsibilities should not be restricted to "women's issues."

3. The spousal employment problem will become increasingly important. The Department should urge the university to develop an office (e.g. one like the Spousal Relocation Office at Purdue) to assist in solving this problem. An interesting option might be an area-wide consortium of institutions that might collaborate in this.

D. *Male Faculty*

There was generally agreement among the male faculty members that this was an especially congenial department. They thought that there was university support at the highest levels to increase the number of women on the faculty.

One minority faculty member articulated that there was an openness in the Physics Department with respect to diversity issues, and that he had never been disappointed in this department. He also stated that he has never had a female graduate student who communicated to him that she felt the department environment to be hostile. This faculty member also described his recent experience in involving undergraduates in his research for a month during the summer. Over the last two years he has had 5 undergraduates participate — 3 of them are women.

We asked about how faculty attract graduate students to their research groups. Most agreed that teaching graduate courses is a particularly effective way to get acquainted with the students and to get them interested in their research. In addition, the graduate students had recently started a lecture series on Physics at the Frontiers, given by department faculty. These presentations helped to attract students. The Associate Chair for Graduate Education also matches up first-year graduate students with various research groups.

Regarding undergraduate physics students, the male faculty mentioned that they have the impression that more women than men "drop" the physics major. They discussed faculty advising and expressed the view that it should be mandatory. Students generally are not good about keeping in contact with their advisors. They also mentioned that there was a very active Society of Physics Students (SPS) chapter, although the most active students were not always the best academically.

E. *Graduate Students*

The statistics provided to the site visit committee (in the department's 1999-2000 and 2000-2001 Diversity Plans) indicate that over the period from 1995 to 1999 the total graduate student enrollment in the department has ranged from 224 to 162 with an average of about 180. The current graduate student enrollment is 171 (22 women). This fraction, 13%, is slightly below the 1999 high of 14% but above the minimum of 10% (1995, 1996) and slightly above the average of 12%. This figure is approximately equal to the national average. The retention rate for female students was lower than that for men, with about 23% of those who departed without completing their degrees being female. The committee met with six of the current female graduate students,

the majority of whom were in their second or third year of study, with the remainder being at an advanced stage. Those who attended the meeting represented about 25% of the total female graduate student population. They reported generally neutral to positive feelings about the climate that they experienced.

The first-year students, and those who remain unaffiliated in the second year, are assigned to a member of the faculty who serves as graduate advisor. Several students noted that it was particularly important to them in the first year to have a faculty member to whom they could talk about their difficulties and their research inclinations. Some had experienced such sympathetic interactions, others had not. They felt that this need was not limited to female students, but was felt particularly acutely by them. The committee also learned about the role of the graduate advisors to the first-year students from male faculty with whom we spoke and from the Associate Chair for Graduate Education. First-year students are assigned to a subset of the faculty, who perform the function on a rotating basis to distribute the workload. The faculty in the subset are chosen with some thought by the Associate Chair, and those whom he feels are ill-suited to the task are not asked to perform it. The Associate Chair talks with faculty members before they begin to serve as advisors, but does not give them very much in the way of guidelines. No attempt is made, by soliciting student feedback or otherwise, to evaluate how well they are performing the task. According to the graduate students with whom we spoke, some are very effective and others are less so. Not all are familiar with the rules and requirements for graduate study, and some are less assertive about recommending that students with less-extensive preparation take undergraduate courses before beginning the core graduate sequence. When queried about the advising they had received to help them choose a research area, the female students with whom we spoke responded that resources are there to help them "if you look." The seminar program for first-year students was somewhat helpful in this regard, and an e-mail message is sent out with a list of faculty who have RA appointments available. The second-year students who attended the meeting had not yet acquired a research advisor, though they had decided on the subfield they wished to study.

The male faculty with whom we spoke lamented that the students (male and female) took too long to identify a research advisor and begin work on a thesis project. Lists of faculty willing to take on new students are circulated, but the process of matching students with advisors is "a random walk" without a formal mechanism. Having been informed about the new graduate seminar on physics teaching that the department has instituted for TAs, the committee questioned the female graduate students about their experiences as TAs. Some had extensive experience in teaching, due in part to a lack of RA support for their research (they noted that the provision of TA appointments for students working with faculty who lacked grant support for RAs was a good feature of the department). Most had a strongly negative opinion of the new seminar for TAs, though none had any personal experience with it. The prevailing view was that the only way to improve one's teaching was by practice, that "you can't teach somebody how to teach." The impact of this on the undergraduates they were teaching did not seem to be a matter of concern to them. Past efforts at peer review of teaching by "super TAs" seemed not to have been successful, as feedback from the observations was not always given. Issues that are traditionally particularly pertinent to women did not seem to be of concern to these students. In regard to personal safety, they expressed no special concern but did note with approval that the department avoids assigning female TAs to sections that meet late in the evening. All of the meeting attendees were unmarried, and none of the female students in the department have children as far as these students were aware (though some of the male students do).

The students characterized their camaraderie with their peers as good, but there did not seem to be any particular sense of community among the female students. The semiannual pizza lunches

established for that purpose are poorly attended, and it appears that little interaction occurs at them. The students had rather little to say about their interactions with their research advisors. None of them mentioned any incidents of negative interactions with faculty that appeared to be gender-related rather than to result from individual personality conflicts. The Associate Chair for Graduate Education noted that some oversight of student progress and the advisor-student relationship is provided by an annual questionnaire that the advisor and student fill out separately. Any significant discrepancies between the descriptions of the stage the student has reached on the project, and the estimated date of completion, are investigated by the Associate Chair.

The committee toured some of the department's facilities, including graduate student offices (TA and RA). The lack of luxury the offices afforded was typical of a physics department, but the committee saw no attributes of the physical environment that would have a disproportionately chilling effect on the climate for female graduate students.

Recommendations:

1. A knowledgeable and empathetic first-year advisor is important to the success of all students. We therefore recommend that these faculty be chosen with particular care. They should be empathetic individuals who are willing to take the time necessary to find out the needs of each student. The advisors should be familiar with the department's rules and procedures regarding taking undergraduate courses, timing of exams, etc. Efforts should be made to determine the effectiveness of these advisors, in part by consulting the students.

2. The perennial problem of launching students promptly on their thesis work can be helped by a more pro-active approach to matching students with advisors. This can take the form of "show and tell" sessions, open group meetings, and other ways of bringing together students and potential advisors. Simply making the information about RA openings available and expecting the students to act on it appears to be less successful than the department would wish. First-year advisors can also help by discussing the students' interests and suggesting potential advisors.

3. Based on the students we spoke with, it does not appear that the idea of learning how to teach is yet a part of the TA culture in the department. The new graduate seminar for TAs on physics teaching may help with this, but it is important to make it clear to all TAs that they are expected to work to improve their skills at teaching, and that they have a responsibility to the students they teach. As the first (and in some cases only) physicists that these students encounter “close up,” TAs have a special responsibility to model appropriate attitudes and behaviors.

4. All students (and postdocs) would benefit from greater exposure to the wide variety of careers for which their physics education prepares them. We recommend that the department invite some of the many physicists in the DC area who are using their physics training outside of academia to visit the department and speak with the students. This also would give additional opportunities to showcase successful women. A broader picture of the ways in which physics can be combined with family life would also be helpful to the students, and the faculty could provide additional examples.

5. In order to foster more of a feeling of community among the women in the department, we recommend that events such as the pizza lunches be given more structure. Inviting a female visitor (colloquium or seminar speaker, “non-traditional” career exemplar, local expert, etc.) to be a guest at the lunch, and identifying a topic for the meeting (e.g. work/family issues, sexual harassment, participation of women in physics internationally, communication styles, ethical issues,

etc.) could increase attendance and engagement. The students and postdocs could be charged with the organizational effort, with assistance from faculty to identify resources (human and otherwise). In this way, the students would have "ownership" of the events, and the burden on female faculty would be reduced.

6. We recommend that the Department institute exit interviews for all students who leave before completing their intended degree. While individual cases arise from individual circumstances, the fact that the retention rate is lower for female students than for males suggests that there may be some systematic way in which the department can make it more likely for women to succeed. Patterns in the reasons for leaving may prove informative, so it would be wise to gather such data.

F. *Undergraduate Education*

The Team met with undergraduate women in two scheduled sessions. Two students participated in the morning and five in the afternoon.

Both of the students who came to the morning session seemed pleased with their experience as physics majors at the University of Maryland. Although the afternoon session started out in the same spirit, some problems surfaced in the discussion. It was pointed out that the retention rate is lower for women than it is for men. It is hard to be sure why this is the case but a contributing factor may be that women are more sensitive to the arrogance they perceived among several members of the faculty. The students indicated that some professors regularly responded to student questions with derogatory comments and that these interactions had a negative effect on the morale of all students.

All the students in both sessions appreciated the support offered by the four women faculty. All the students stressed the importance of good advising and generally expressed satisfaction with the quality of advice that they had received.

Recommendations:

1. The effectiveness of the non-faculty advisor should be carefully monitored.

2. All faculty teaching undergraduate courses should be alerted to the necessity of continual awareness that insensitive remarks can drive students away from physics. Most students find physics difficult and often fail to see what faculty regard to be obvious. Extra patience is essential. Students should be helped to understand rather than made to "feel stupid." The reward for attention to this will be increased retention of majors.

3. Careful selection, training, and monitoring of TAs who come into direct contact with undergraduates is essential. Non-native speakers of English should be required to improve their skills.

G. *Female Postdocs and Research Associates*

Four women postdoctoral fellows met with the committee. Unlike graduate and undergraduate students for whom the department has a clear responsibility in their education and training, these women are "on their own," in a situation in which their research advisors and their research experiences determine in large part their next career step. At this critical transition point, as these highly-trained women are poised to move into tenure-track and more permanent positions, there is evidence that the system and the paucity of role models may not be serving them well. The

women all seemed to agree that "many problems come with having so few women in the department" — at all levels. As one of them noted, there is significant negative feedback when women don't see other women "higher up."

There was evidence of considerable *angst* among several of the women. One issue involved the lack of response by a faculty member to a complaint about a woman graduate student being harassed by a laboratory technician. This issue had been raised at the women's pizza lunch, and the reaction of the faculty member made the women postdocs very angry and they have avoided these events since then. There appears to be a need for an ombudsperson to whom students, postdocs, faculty or staff could go to handle work-related conflicts, including harassment issues. It is important that everyone is made aware of this avenue for dealing with conflicts, and that the ombudsperson be given the knowledge and resources to be truly effective in helping to find a resolution. It is also essential for everyone in the department to feel that complaints involving harassment are taken seriously.

A second issue which at least one woman was facing involved her perception that it is impossible to be a woman, who is married and has children, and be a physicist pursuing research in a highly competitive subfield of physics. As she stated very forcefully: "this is not a field that is attractive to women." The committee felt frustrated in not being able to pursue this topic in more depth, because of lack of time. This young woman had formed a very macho, old-fashioned view of a career in physics, and the impossibility of solving dual-career couple problems.

Recommendations:

1. The Department should appoint an ombudsperson who would be available to counsel students, postdocs, faculty and staff regarding interpersonal difficulties, particularly harassment issues. Ensure that everyone knows of the existence of this person.

2. Someone in the department should coordinate the discussion of career options and choices. In some subfields there are very few opportunities available, and students (both male and female) would be helped by recognizing this reality and by looking to identify other opportunities involving physics.

3. The Department should invite several women colloquium speakers per year (we heard that there were very few women ever invited to give talks) to speak about their science and then over lunch to discuss issues of family/career balance, the dual-career couple problem, etc. with students and postdocs. Again, both men as well as women are interested in this issue.

III. **Conclusions**

The Physics Department has been able to develop a largely congenial environment for faculty and students. The University is committed to diversity and has fostered a culture that promotes it. The Physics Department has in place many successful programs to promote diversity.

Several actions could improve an already positive climate. The most important of these include increasing the number of outstanding female faculty, providing an ombudsperson for the department, emphasizing the importance of effective teaching in TA training, cautioning teachers of

undergraduates to be supportive of their students, and promoting the development of an effective community of the women in the department.

We repeat our detailed recommendations here:

- *Faculty Issues*

Continue to work on recruiting more women faculty. A critical mass (say 10% of the tenure track faculty) of women faculty would greatly contribute to the institutionalizing of the positive climate.

Take care that the women faculty not be overburdened with service responsibilities and that these responsibilities should not be restricted to "women's issues."

The spousal employment problem will become increasingly important. Urge the university to develop an office (e.g. one like the Spousal Relocation Office at Purdue) to assist in solving the spousal employment problem. An interesting option might be an area-wide consortium of institutions that might collaborate in this.

- *Issues of Community, Life, and Careers*

Appoint an ombudsperson to counsel students, postdocs, faculty and staff regarding interpersonal difficulties, particularly harassment issues. Ensure that everyone knows of the existence of this person.

Try harder to make the pizza lunches or other informal gatherings "work" as a means of establishing community among the women in the department. Conversations on the compatibility of physics with family life could be a topic for such informal get-togethers.

Give undergraduates, graduate students, and postdocs more exposure to alternative careers and the world of physics work. Bring in visitors who are using physics training outside academia (they are thick on the ground in the DC area). Help students see that there are lots of interesting things to do after completing their degrees.

Invite several (2 – 4) women colloquium speakers per year to give presentations about their research and to engage in discussions on physics and family life (perhaps at an informal lunch) with students and postdocs.

- *Graduate Student Issues*

Use more care in choosing as first-year advisors for graduate students, empathetic individuals who are willing to take the time necessary to find out the needs of each student. The advisors should be familiar with the Department's rules and procedures regarding taking undergraduate courses, timing of exams, etc. The advisors' effectiveness should be monitored.

Work to develop a better system to match up graduate students with advisors and to get them started on their thesis work.

Investigate why the retention rate for women graduate students and undergraduate majors is lower than for men. Do exit interviews with all students who depart without completing their degrees or change majors with junior or senior status.

- *Undergraduate Student Issues*

Foster a culture among the TAs that embraces the reality that good teaching is a skill that can be learned, and that a beginning teacher can benefit from the wisdom of the more experienced and from the results of research into the subject. Give the TAs appropriate feedback so they can tell how they are progressing toward being better teachers. Make it clear to them that it matters.

Select, train, and monitor the TAs who come into direct contact with undergraduates. Require non-native speakers of English to improve their skills.

Carefully monitor the effectiveness of the non-faculty undergraduate advisor.

Alert all faculty teaching undergraduate courses to the necessity of continual awareness that insensitive remarks can drive students away from physics.

Most of our suggestions, especially those concerning undergraduates, apply equally to men and women. Women tend to be more sensitive to a hostile or unfriendly environment but all potential physics students will respond positively to a friendly environment. We commend the Physics Department for the efforts they have made to create a positive climate for women and encourage them to address the remaining problems.

The Team would like to thank everyone at the University of Maryland for the hospitality we received. We give special thanks to Jordan Goodman and Rika Shanmugavel at Maryland and Suzanne Otwell at the American Physical Society for their hard work in preparing for and facilitating this visit.

Respectfully submitted,

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