

Ethics Awareness

opening remarks by

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Graduate Education in Physics: Which Way Forward?

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I will focus my comments today on two questions: what ethics-related information is essential in physics graduate education and by what mechanisms can students acquire this information? Part of my philosophy in developing ethics education programs is that while it is unrealistic to expect to change the moral compass of an individual in the confines of the time normally available to ethics education, it is realistic to hope that we can provide useful information about ethics to the individual who desires to be ethical.

Among topics that are essential to the education of graduate students are:

Data acquisition/management—This topic would include the objective acquisition and analysis of data, the proper storage of data in both written and electronic form, and the rules for sharing data with others.

Laboratory safety—Students need to be aware of proper procedures to protect their own safety as well as that of their colleagues and those who have incidental contact with the lab.

Publication/presentation standards—Students should understand how to fairly represent their results and what acknowledgments of colleagues and others in the field are appropriate.

Dealing with misconduct—Everyone in a research organization should be aware of the rules of that organization for reporting suspected misconduct.

Requirements of the funding agency—Most funding comes with strings attached, often including when and how results should be disseminated and how funds may be spent.

Social responsibility—Virtually all students benefit from public funding of the scientific endeavor, so all students should be aware of their obligation to use their scientific knowledge to benefit society.

Students can acquire knowledge of the above topics in a number of ways, including:

Diffusion—By working with others who are familiar with procedures, such as how to keep a lab notebook, students may themselves learn these procedures.

Mentoring—A mentor may make a specific effort to inform the student of procedures or standards as they come up in the course of a research project.

Seminars—A department may include seminars on some of these essential topics as part of an on-going seminar program or as part of a program targeting beginning graduate students.

Reading—A student who keeps up with publications such as *Physics Today* is likely to encounter a discussion of many of the topics listed above.

Modules—A department or university may develop materials tailored to their own educational needs. These materials can conveniently be packaged into online learning formats.

Courses—All or part of a course can be devoted to ethical issues.

Questions for discussion:

1. What information is essential?
2. At what point(s) in a student's career should we make a concerted effort in ethics education?
3. What resources are useful?
4. To what extent do physics faculty buy in to the notion of ethics education?