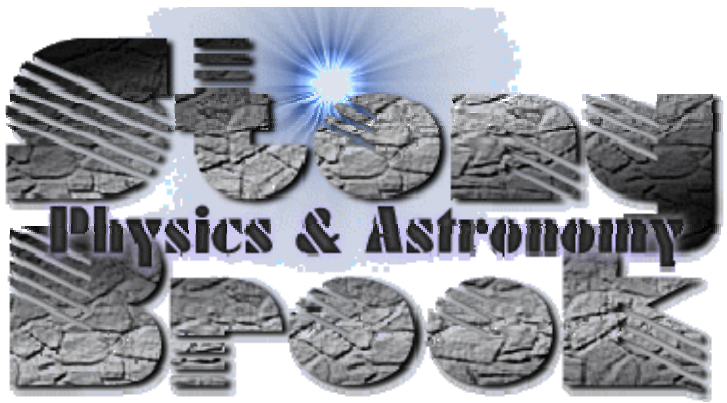
Academic Honesty and Professional Ethics

- Academic Honesty
- Stony Brook policy
- Research misconduct
- Publications, Review, and Peer Review



P. Koch 28 August 2008 (adapted with minor changes from P. Grannis 23 Aug. 2004)

None of us is expert on these issues, but we must understand them as they affect us all in vital ways. It is part of building a collegial, productive, and professional environment in which we can all learn and do research. It allows us to trust one another.

It is important that you consider and engage these questions now, before they arise in your career that begins here. One hopes that the negative aspects will never arise, but in the past few years they have arisen in our profession. We will review two such sad cases that ended the careers of two young "star" physicists.

We expect honorable and ethical behavior by all our students, faculty and staff in the Department.

Academic honesty

- **Putting forward the ideas or work of others as your own without appropriate attribution is dishonest.**

Cheating on exams: **both giving and getting** information from others is cheating; it will be punished. The penalty can range from ZERO on the exam, through failure in the course, to suspension from the University.

Homework policy: do not assume that collaborating on homework, lab work, etc., is allowed; some instructors encourage cooperation for some assignments, but others don't. **ASK FIRST!**

Plagiarism:

Term papers, research reports, seminar talks: What you write (or say) is expected to be your own if not attributed to the work of others.

- **PLAGIARISM is the use of the written work of others as if it were your own.**

With the World Wide Web, access to written material on nearly any subject is readily available. It is easy to locate the work of others and, therefore, easy to detect and track plagiarism in student papers.

If you are summarizing the work of others, give the reference you use and indicate clearly what work or ideas comes from others and what is your own interpretation or synthesis. If you use the words written in someone else's work, put them within quotation marks " " and give the reference to their source.

The penalty for plagiarism will range from ZERO for the particular project, to failing the course, to being suspended from the university.

Action on reports of academic dishonesty

The first line of action will be recommended by the relevant faculty member for the course or research project.

In case of accusation of academic dishonesty (or a charge made by a student regarding misbehavior by faculty) the accused may appeal and request a hearing by the Department. A grievance committee is appointed by the Grad Director/Chair; it should have equal representation from faculty and students (people not involved in the particular case). The committee does fact-finding and proposes an action to Chair and Graduate Director, who impose an appropriate penalty.

Appeal of decision at Department level can be made to the Dean of the Graduate School and, ultimately, to the President of the University.

Some past examples:

1. TA in PHY 515 (Graduate Lab) gives copy of old lab experiment to a friend taking the course, "to use as a guide". The friend writes up a lab report that is very similar to the old report given by the TA. Upon investigation and after accusation, copying was admitted.

   TA support was denied for one semester for both students. The student who copied the lab had to retake PHY 515 and do new (different) experiments. Letters of censure were entered into the files of both students.

2. Students use papers from the web, without attribution, in a term paper assignment. Instructor finds the original papers with a simple Google search and recommends failure in the course for the accused students.

3. Student is found consulting with another during a comprehensive exam. Both fail the exam and lose TA support for a semester.

Faculty responsibility to students:

- The faculty is responsible for treating students fairly and with respect. No harassment of students will be condoned. There shall be no bias based upon ethnic group, national origin, or gender.
- The department is committed to a fair and timely evaluation of work done by students.
- The faculty is committed to adequate preparation for courses and to provide a description of the material and expectations for students at the beginning of the semester.
- The work of students shall be fully and fairly recognized in courses and in research publications. Faculty and research staff participation as authors in publications shall be based on the same rules as applied to students – a significant contribution to the work being reported.
- Failure to fulfill these responsibilities by faculty and staff will be dealt with by the same procedure used to resolve allegations of student misconduct.

Scientific misconduct

Scientific research is conducted on the basis of trust that the work is accurately recorded and reported and is analyzed without bias. The entire scientific enterprise rests on the assumption that the data and analysis are as stated in the report.

- **Falsification of results**: We assume that the data reported were actual observations made by the authors.
- **Plagiarism**: We assume that the description of the problem, the methodology of the study, and the conclusions are those of the authors unless they are noted and referenced as the work of others.
- **Fair authorship**: We assume that the authors listed all made significant contributions to the research and that others whose contributions should be recognized have not been omitted. *Each author has a responsibility to verify the correctness of the assertions in the paper.*

Flawed scientific results can be a result of

a) **Bad luck**: Statistical fluctuations can give a new and surprising result even when there is best intent on the part of the researchers. Some fields have standards: a "3 sigma" result gives 'evidence for'; 'discovery' requires at least a "5 sigma" result. All experimental results must be accompanied by an appropriate and well-explained analysis of uncertainties, both random and systematic (the "error analysis"). Theoretical papers must clearly state the assumptions and methods.

b) **Mistakes**: Mathematical or computational errors; using incorrect reagents or materials; misapplication of probabilistic methods. Mistakes can be honest, but when found they must be admitted publicly and their effects rectified.

c) **Misconduct**: Deliberate manipulation of data; claim to have performed cross-checks that were not done; wholesale falsification of data ("inventing things that never happened").

In the end, the best defense against bad luck, mistakes, or misconduct is subjecting the claims to independent confirmation of the results – new experiments or calculations, carried out by others or by you (with others).

Some recent examples of flagrant misconduct

Discovery of transuranic elements:

Victor Ninov and collaborators at Lawrence Berkeley Laboratory announced the discovery of elements Z=116 and 118 in 1999. In 2001 the co-authors withdrew the papers because they were unable to reproduce the evidence. They found evidence that the data had been fabricated in a major way. Subsequent examination of the data related to the discovery of elements 111 and 112 in Germany, also showed signs of data manipulation (in a non-significant way) by Ninov.

Mesoscopic devices:

In the 1990s Jan Hendrik Schön at Bell Labs published a series of papers on molecular scale electronic devices, ranging from thin films to new organic superconductors. Though the papers had coauthors, Schön did the experiments alone. Primary data were deleted from computer disks; evidence was found that reported data were fabricated. Data were in some cases replaced with mathematical functional forms. Graphs from different experiments had the same "points". The papers were formally retracted from the journals. Schön's Ph.D. was revoked in 2004.

Lessons from these blatant cases of scientific misconduct:

1. Ninov and Schön were highly respected rising stars in their fields with great future prospects. After their scandals broke, both lost their jobs due to misconduct. Their scientific careers are ruined.

2. The taint of these fabrications is felt not only by the authors but by the institutions they worked for and the entire physics community.

3. The coauthors in both cases, though not accused of dishonesty, clearly failed in their responsibility to check data and results. If you cosign a paper, you have a responsibility for the integrity of the result. If your name is there, you are responsible.

4. In the end, both cases were self-correcting. (It always is when the science is important. The only question is how long it takes before the correction comes.) The long-standing requirement that a new discovery be subject to independent confirmation meant that these fabrications were brought to light, in these cases, rather quickly.

5. Primary data must be preserved and protected with integrity. This includes computer files, notebooks, and details of calculations. Your memory is not sufficient!

Science is a human enterprise and, therefore, is subjective; there are often ethical and scientific questions. A real example:

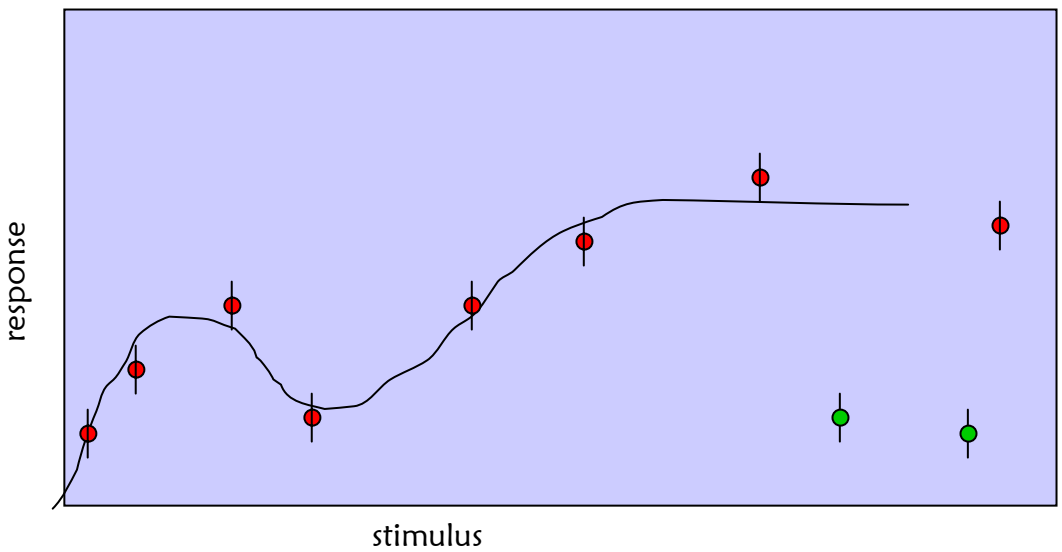
In the 1920s, Adriaan van Maanen of Mount Wilson Observatory tried to determine whether spiral nebulae (like Andromeda) were inside or outside our galaxy. He took photographs at several year intervals, deduced that the spirals were 'unwinding', and concluded that the nebulae were in our galaxy since motions would be impossible to detect in external distant objects. This led to the widespread belief that spiral nebulae were objects in the Milky Way until Hubble clearly measured their distance by other means (Cepheid variables).

Van Maanen was wrong, but he was not ethically at fault. He was using standard techniques of the day, accepted by the community; he was trying to make measurements at the limit of systematic error. It is likely, however, that his expectations that nebulae were in our galaxy influenced his data and analysis ("intellectual phase locking").

Beware the prior bias: We must observe Nature and calculate dispassionately, without being guided toward a desired outcome.

Some hypothetical examples to discuss :

A graduate student and postdoc do a measurement on semiconductor materials at a neutron source facility. Back home they plot and compare their data to the new theoretical curve shown. "Bothered", they look at their logbook and see that they took two points (shown in green) during a period of intensity fluctuations in the source, so they "worry" that these two points may be suspect. They also know that other researchers are preparing a publication that confirms the theory (solid line).



The postdoc suggests omitting the green points on the basis that these data are "obviously wrong".

What should they do?

Should the green points be included in tests of statistical significance?

Where to go to get advice?

A group at university X publishes a “revolutionary finding” based on use of special materials that were laboriously made by a student in the group. The competing group at laboratory Y, whose model is challenged by the new result, writes to ask for a sample of the special material; they want to conduct an independent experiment. The amount of the material at X is limited and, if shared, would limit the program of the student at university X. Furthermore, sharing the material would open a competition that could undermine the student’s Ph.D. thesis.

How should the student and advisor at university X respond?

A large international collaboration made measurements of the same physical parameter (the mass of a new particle) using two different techniques with different data sets. The two measurements were made two years apart, and in that time the collaboration membership changed somewhat.

The whole introductory section in both papers that describes the scientific motivation for the measurement and outlines the basic methodology used was the same.

Since the author lists were not the same for the two papers, did this constitute plagiarism?

Conflicts of Interest:

Most physicists "owe" respect and loyalty to more than one person or group. Research support by for-profit entreprises ("companies") with a stake in outcomes can generate conflicts of interest.

1. You will be called upon to write letters of recommendation for students or colleagues – for jobs or for financial support. If the person is a friend or close colleague you want to do the best you can to promote his or her career. But what about your responsibility to the person who wants and needs the best information possible to make a hire or award a grant?
2. What would be the effect on your career if you are sponsored by a company whose business depends on the process you are developing, and they reserve the right to review it and possibly deny publication to retain some proprietary advantage?
3. You are called on to review the manuscript of a competitor's research paper. You are close to getting a similar important result and by delaying your review, you might catch up and "scoop" the competitor.

The simple rules:

- Be an ethical professional. Don't cheat and don't plagiarize in written or oral work in courses or research. The penalties can be severe.
- Respect the scientific tradition and report all data honestly and factually.
- Be objective : Make conclusions based on what is in your data or calculations, not on what outcome you want.

The harder issues are in the grey areas, where you have conflicting pressures from different sources. The best rule of thumb for these is to ask and discuss the issues with colleagues and mentors.

The Stony Brook Department of Physics and Astronomy is a collegial environment. We want you all to succeed and help advance understanding of the universe. An honest approach to learning and research is a prerequisite to that success. Be proud of yourself.