

ADVANCED PHYSICS LABORATORY: PY581

AdLab emulates an industrial, national or academic research lab to familiarize each junior researcher with experimental methods, technical skills, data analysis, presentation practice and publishing experience. We do not “teach”, but help each intern to master the equipment necessary to observe, measure, and discover physics phenomena. Pursuing your choice of three out of many development projects gives you a broad overview of current technology. AdLab will give you hands-on experience with what you have to work with in a professional research environment: you are given a collection of old junk that can miraculously earn you a Nobel Prize once you get it all to work at the same time to measure a new physical observable, or a known one much better.

As everywhere these days, you must collaborate. You will work in a peer group of two, with the oversight of a TF, the Labs Manager, and the Director. Your seminar presentation and four written draft papers will be independently prepared. You will quantify your results with statistical and systematic error bars. You will hone your skills at assembling, debugging, and calibrating apparatus, recording data, evaluating it and its error, and preparing a draft Physical Review Letters (PRLs) or Review of Scientific Instruments (RSI) paper for each of your projects.

Each experiment is under development; none has a "cookbook" recipe. You are expected to develop experimental procedure from wherever you can, *e.g.* previous work in the literature, equipment manuals, materials in the lab, books, the library, and in discussion with your collaborators and colleagues. You must do your "library" preparation before you appear in the lab. Your "deliverable" is to present the results both in writing (prepared for a premier physics discovery peer-reviewed journal) and orally (for critique by your AdLab peers as if you were presenting at an annual APS meeting).