Goal: Learn the fundamental science of interactions of energetic ion and laser beams with materials, and technical applications.


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Tests: February 11, April 1, and May 8 (Final Exam)

Grading breakdown: Homework/papers/presentations 50%
Tests 50%

Tentative Topics:

Ion-Solid Interactions

II. Atomic collisions in solids: Monte Carlo and molecular dynamics simulations.
III. Ion-solid interactions. Stopping power, penetration and ranges. Channeling.
IV. Radiation damage. Sputtering.
VI. Ion beam modification of materials, including ion implantation of semiconductors.

Photon-solid interactions

VI. Photon interactions with matter, from X-ray to infrared photons.
VII. Electronic excitations of solids. Radiation Damage.
VIII. Lasers. Laser ablation of materials

Applications to Thin Films

IX. Laser deposition of thin films
X. Sputter deposition of thin films
XI. Ion Beam Assisted Deposition (IBAD) of thin films.