HONR239Y, Elementary Particles for Poets: the quest for the ultimate particles of matter, for the laws they obey, and for the forces that act on them.
Tuesday/Thursday, 11:00am-12:15pm
O.W. Greenberg, Department of Physics

Since the time of the ancient Greeks people have tried to understand what the basic constituents of matter are. This seminar traces the development of our knowledge of elementary particles from 1895 when Roentgen discovered x-rays to the present when searches are underway for the Higgs meson, supersymmetric partners of the known particles, the particles that may make up “dark matter,” and the origin of “dark energy.”

We will consider the dependence of scientific progress on disparate approaches: (i) improved technical means of studying nature, i.e. of better instuments, (ii) incisive experimental studies, (iii) new theoretical concepts, and (iv) mathematical ideas. We will also point out the roles of unmotivated curiosity and of accidents.

The seminar will include mini-biographies of the scientists who made the seminal discoveries and discussion of the evolution of the intellectual climate in which the discoveries were made.

Reading list:


Grades will be based on class participation, five one-page essays and a twenty-page term paper written on a topic chosen in consultation with the instructor. After the term paper has been reviewed by the instructor each student also will present the topic in class. Examples of possible topics are “The wrong turns in understanding
β decay and the introduction of the neutrino as an elementary particle.” “The paradoxes that have been resolved by the exclusion principle.” “The shift from the proton to the positron as the particle predicted by Dirac’s theory of the electron and the concept of the antiworld.”

CORE: Physical science, non-lab.