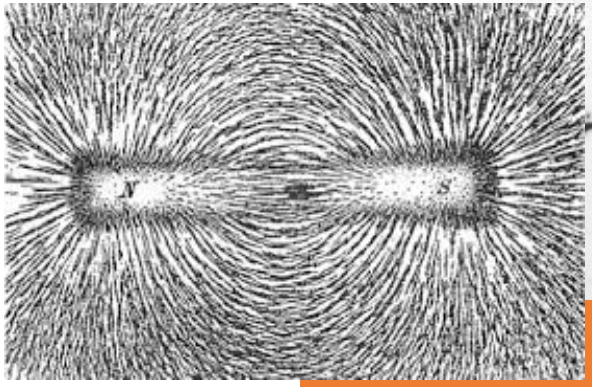
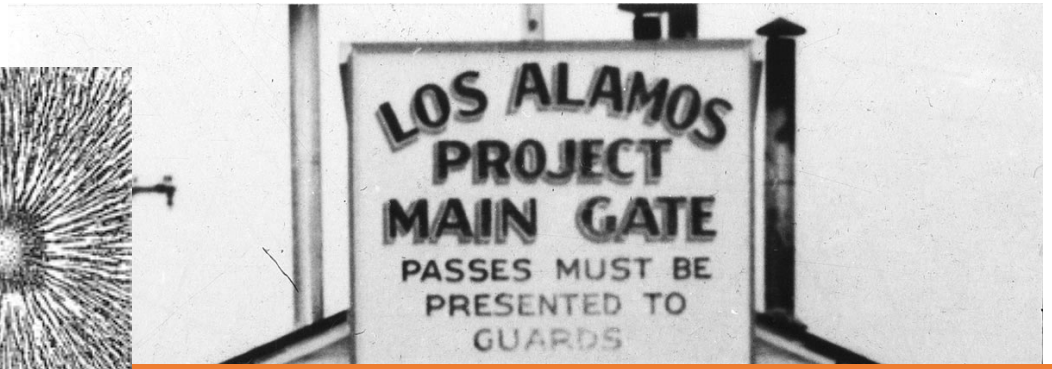


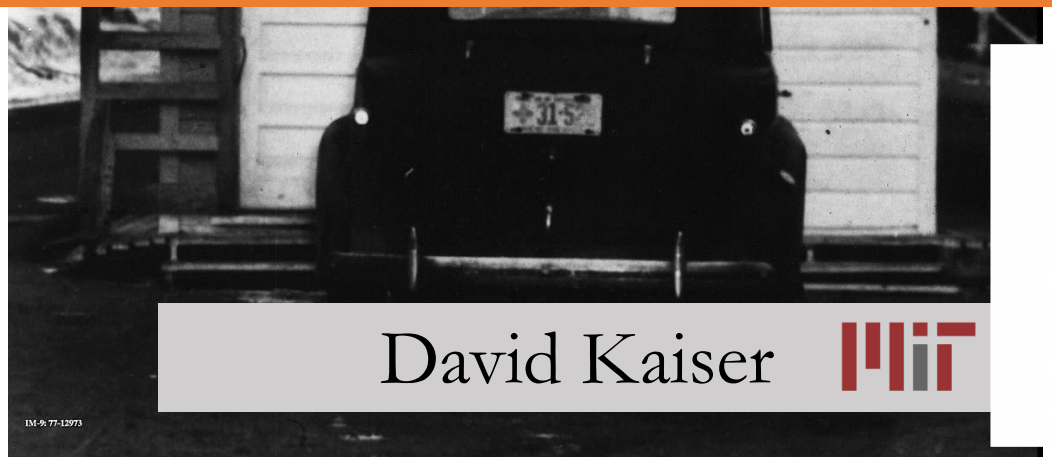
Newton Henry Black, Harvey N. Davis (1913) Practical Physics, The MacMillan Co., USA, p. 242, fig. 200. Image is in the public domain.



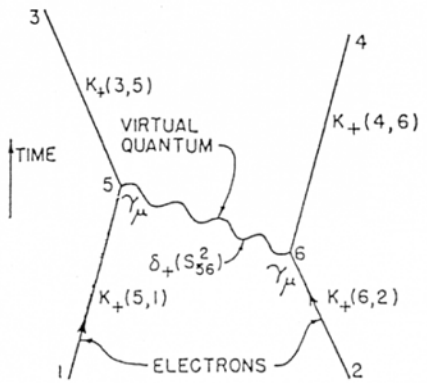
8.225 / STS.042

Einstein, Oppenheimer, Feynman:

Physics in the 20th Century

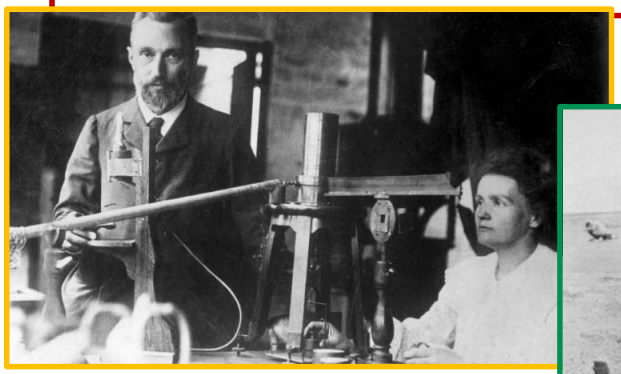


David Kaiser



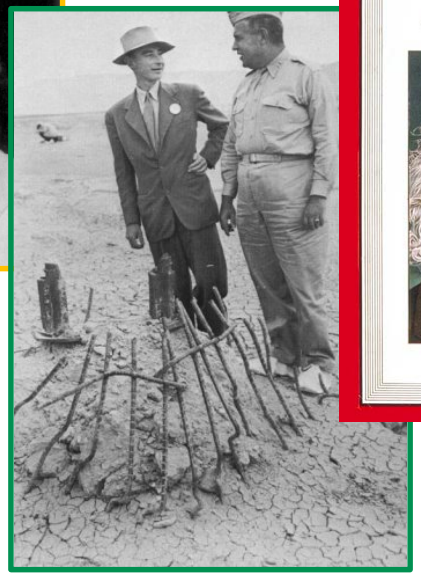
Course Aims

Subject Description: Explores the changing roles of physics and physicists during the 20th century. Ranges from relativity theory and quantum mechanics to high-energy physics and cosmology. Examines the development of modern physics within shifting institutional, cultural, and political contexts, such as physics in Imperial Britain, Nazi Germany, US efforts during World War II, and physicists' roles during the Cold War.

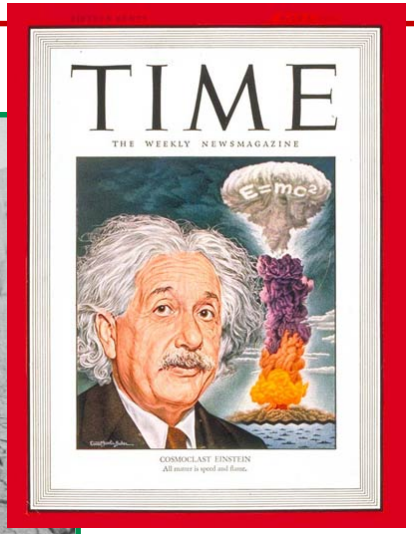


Pierre & Marie Curie, Paris, early 1900s

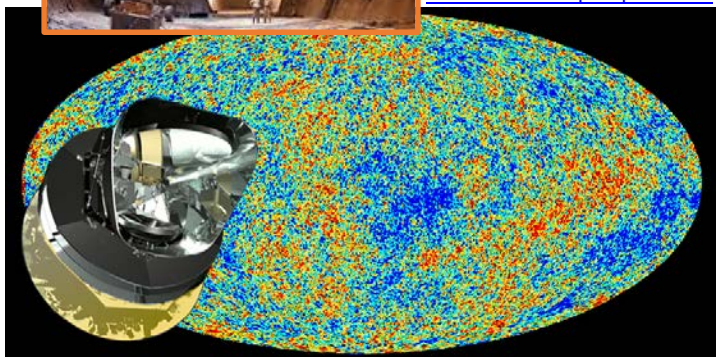
Image is in the public domain.



J. Robert Oppenheimer and General Leslie Groves at the Trinity test site, July 1945



Superconducting Supercollider under construction, 1993



Planck satellite and the CMB, 2013

Course Aims

No prerequisites: This is a Communications Intensive (CI-M) subject for Physics majors, but no prior coursework is required. Our main aim is to improve written communication skills.

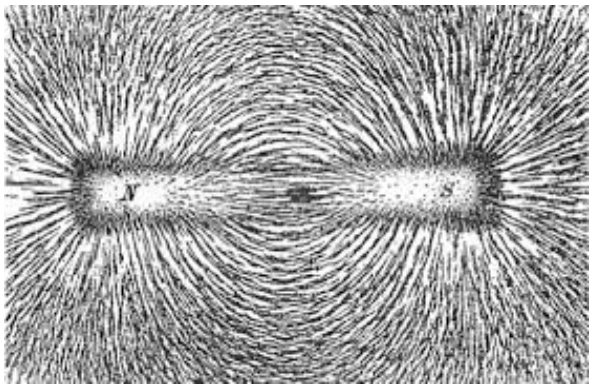
Some readings will involve equations and other formalism, others will not — *for this class*, our goal is *not* to master techniques for calculating. Rather, we will explore a range of **ideas** in modern physics *and* the changing **contexts** — intellectual, cultural, political, institutional — within which researchers have pursued those ideas. (*It's always okay to ask for clarifications about any mathematics or related formalism!*)

The class offers a ***preview*** of many exciting topics for early students, and an opportunity to ***synthesize*** material for more advanced students.

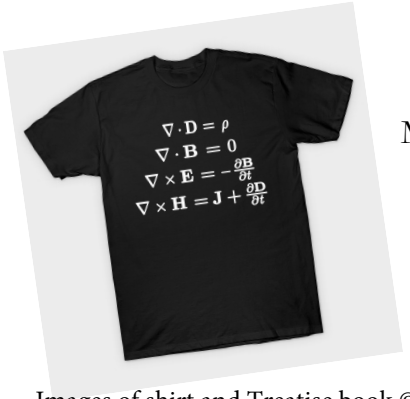
Course Overview

I. Nineteenth-Century Legacy

Newton Henry Black, Harvey N. Davis (1913) Practical Physics, The MacMillan Co., USA, p. 242, fig. 200. Image is in the public domain.



iron filings around a bar magnet



Maxwell's equations: always in fashion!

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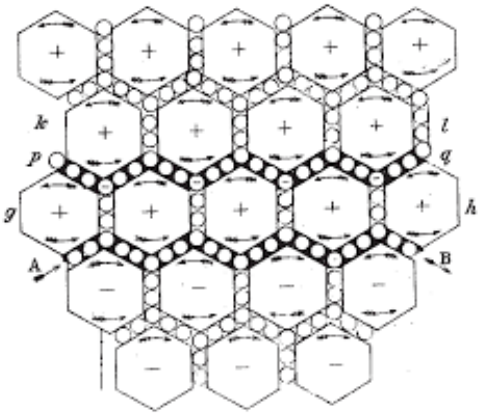
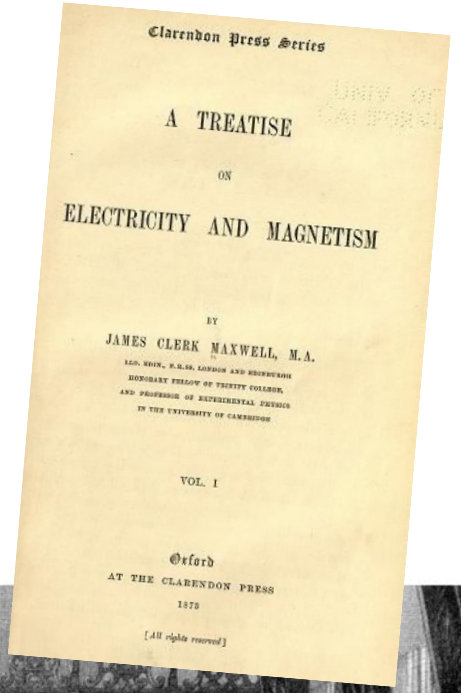


Maxwell's "molecular vortices"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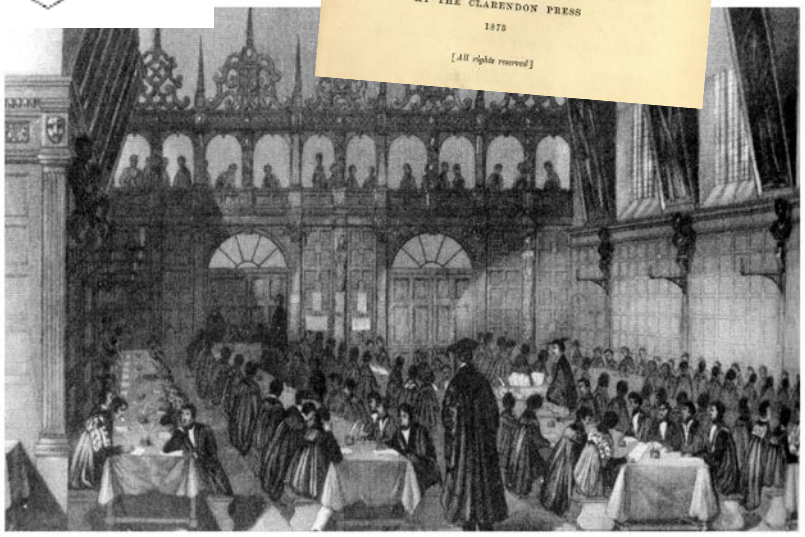


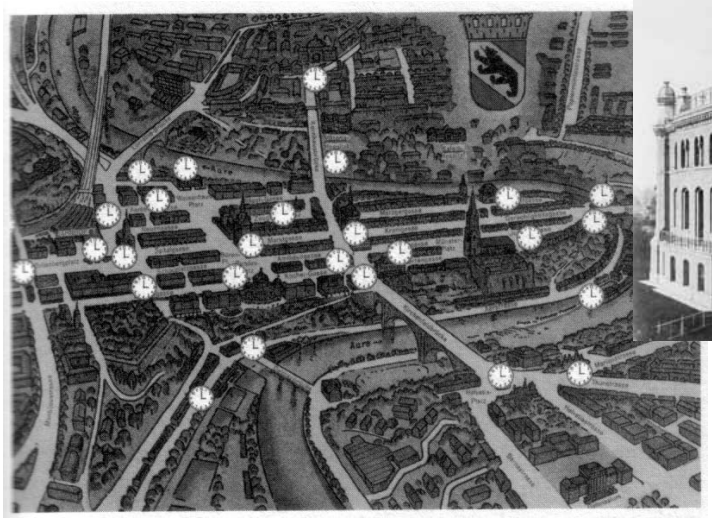
Senate House at Cambridge: Tripos examination

Image is in the public domain.

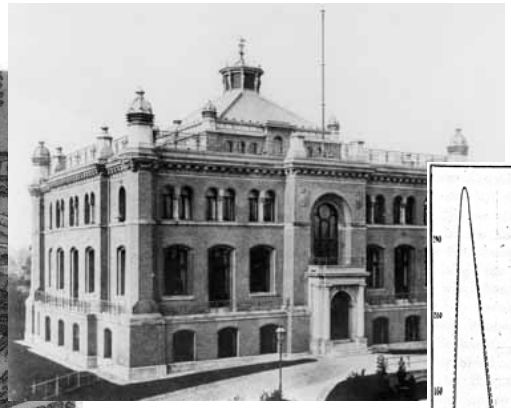
Course Overview

I. Nineteenth-Century Legacy

II. Einstein: Relativity, Quanta, and the Philosopher-Scientist



Einstein's route to the patent office, Bern (Switzerland), 1905



The Physikalisch-Technische Reichsanstalt, Berlin, ca. 1900

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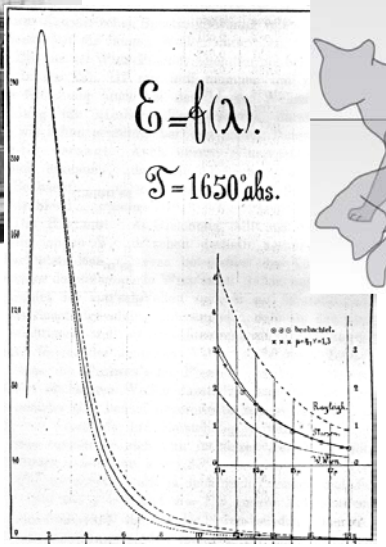


Early data on blackbody spectrum, ca. 1900

Image is in the public domain.

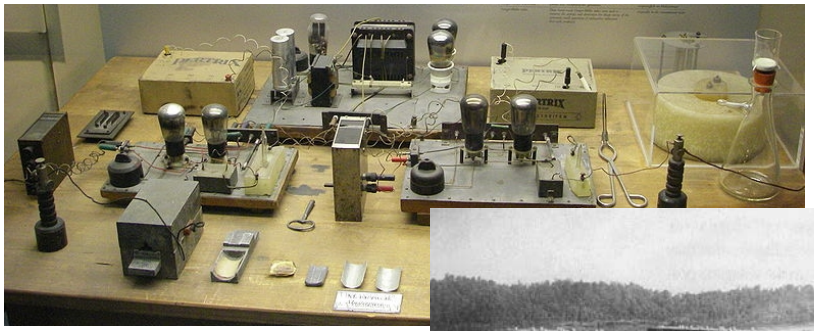
Schrödinger's cat

Course Overview

I. Nineteenth-Century Legacy

II. Einstein: Relativity, Quanta, and the Philosopher-Scientist

III. Oppenheimer: Physics, Physicists, and the State



Hahn and Strassmann's benchtop apparatus in Berlin, 1938

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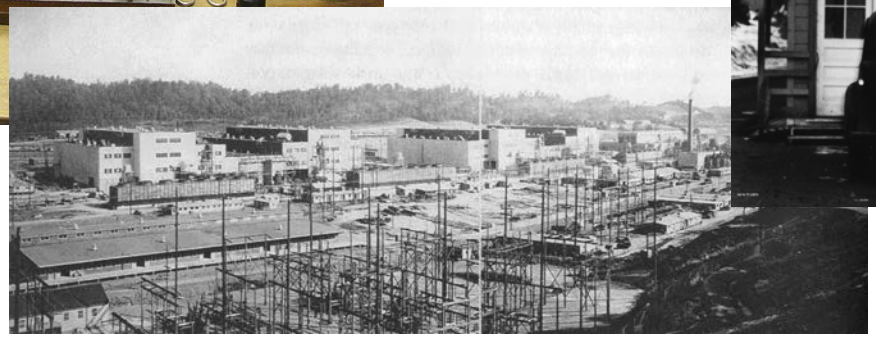
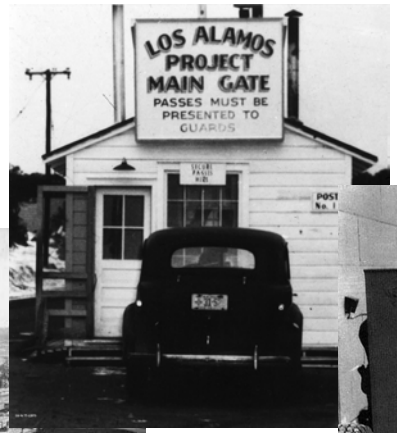


Oak Ridge, TN isotope separation plant, 1944



Loading "fat man" bomb on Tinian, August 1945

Image is in the public domain. US Gov't work.

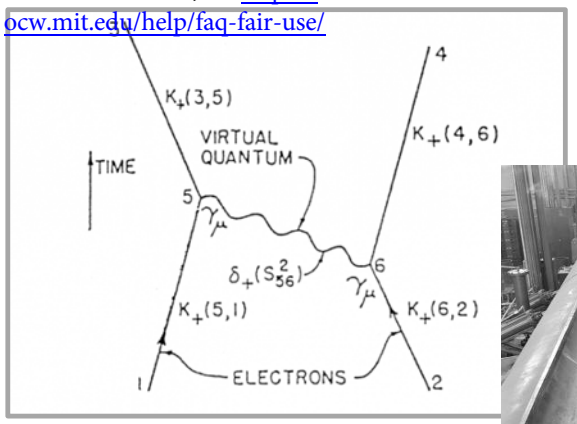
Course Overview

I. Nineteenth-Century Legacy

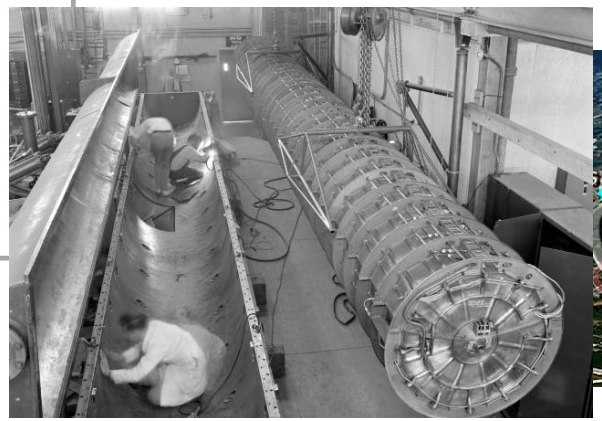
II. Einstein: Relativity, Quanta, and the Philosopher-Scientist

III. Oppenheimer: Physics, Physicists, and the State

IV. Feynman: From Quarks to the Cosmos



Feynman diagram, 1949



Particle accelerator, ca. 1953

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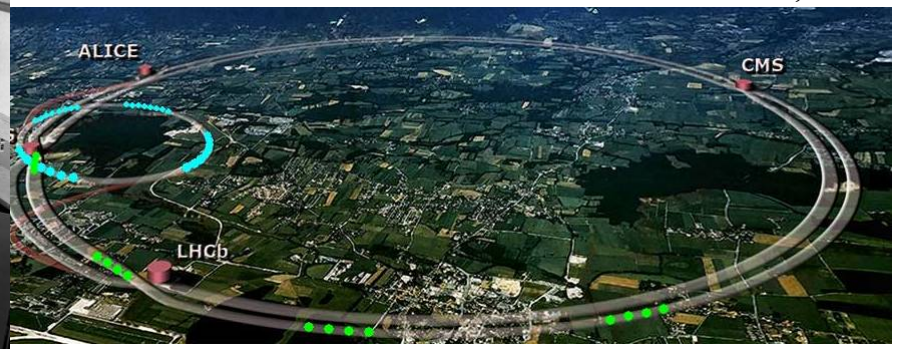
CERN, 2000s



Harper's, 1946: "Physical scientists are in vogue these days. No dinner party is a success without at least one physicist."

STS.042J / 8.225J Einstein, Oppenheimer, Feynman: Physics in the 20th Century
Fall 2020