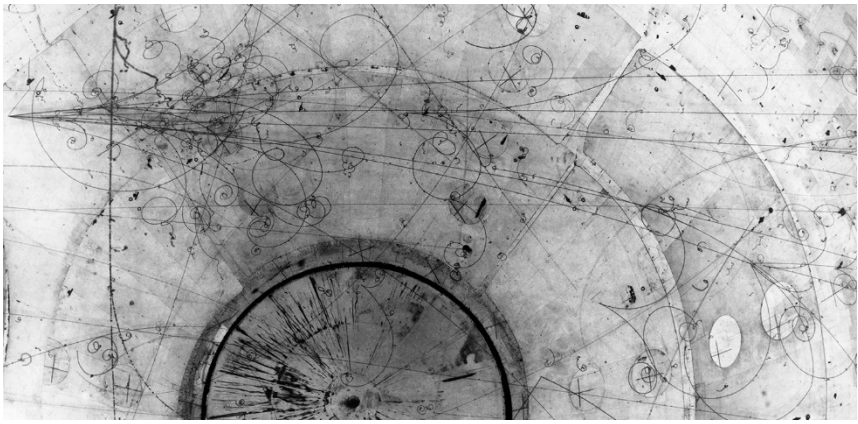
Physics 626 **Fall 2023**

Elementary Particle Physics I



Time: MW 12:40 – 2:10 pm

Room: Nielsen 506

Instructor: Stefan Spanier

SERF 610

Email: sspanier@utk.edu

Tel: 974 0597

Office: Thursday, 1 – 2 pm, or please ask

Web-page is on Canvas (https://utk.instructure.com/courses/182069)

Synopsis

During this **graduate level course** we discuss phenomenological approaches and basic theoretical concepts of experimental Particle Physics. Key experiments in the field are described and their contribution discussed. Most of the material is in the context of the Standard Model of Particle Physics, but shortcomings of the model and new physics beyond the Standard Model will also be presented. The list of subjects to be addressed (is subject to change that will be announced during class and on canvas).

- Standard Model
- Relativistic QM
- QED of spinless particles
- QED of spin ½ particles
- Weak interactions, QCD
- Renormalization
- Gauge Symmetries
- Higgs Mechanism
- CP Violation
- Neutrinos
- High Energy Strong Interactions
- Dark Matter

Recommended Textbooks

F. Halzen and A. Martin, Quarks and Leptons: An Introductory Course in Modern Particle Physics, John Wiley & Sons

M. Thomson, Modern Particle Physics, Cambridge University Press

C. Amsler, Nuclear and Particle Physics, IOP Publishing Ltd.

D. Perkins, Introduction to High Energy Physics, 4th Ed., Cambridge Univ. Press

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D. Griffith, Introduction to Elementary Particles

J.R. Aitchinson and J.G. Hey, Gauge Theories in Particle Physics

G. Kane, Modern Elementary Particle Physics

Review of Particle Properties, online at pdg.lbl.gov

The grade in this course is derived from

- **85% homework**
  Assignments on Canvas (deadline on homework given)
  need to solve 80% of the assignments

- **15% presentation**
  (last lecture dates at end of semester)
  theoretical background and implementation of a measurement

Students with disabilities

If you need course adaptations or accommodations because of a documented disability, please contact the Office of Disability Services at 2227 Dunford Hall (telephone/TTY 865-974-6087; e-mail ods@utk.edu). This will ensure that you are properly registered for services.

Academic Honesty

All work submitted by a student is expected to represent his/her own work. Students are expected to enter their own homework without assistance from others. Students are expected to perform all work in conformance with the University policies regarding Academic Honesty.