

PHYS 6633-001: Advanced Topics In Theoretical Physics

Instructor: Mirjam Cvetič, DRL 4N14, x 8153, email:cvetic@physics.upenn.edu

Fall 2022 MW: 8:30 AM - 9:59 AM

Office hours: MW: 10 AM - 11 PM and by appointment

Topics Covered

The course will focus on D=4 N=1 supersymmetric Yang-Mills theory. Detailed aspects of the effective Lagrangian, the particle spectrum, non-renormalization theorems and supersymmetry breaking will be addressed. As the next step, the N=1 supergravity generalization will be studied, including the structure of the effective Lagrangian and the consequences of the spontaneous supersymmetry breaking there. Specific applications to particle physics will be covered.

The lectures will be accompanied with additional reading material prior and after the lectures. Students would also be assigned advanced reading topics which they would present in class. The exams would consist of a few homework assignments and up to two in-class presentations of assigned topics. I shall be available for extensive after-class discussions and support.

Key references:

S. Martin Review on Supersymmetry:

<https://inspirehep.net/literature/448462>;

<https://arxiv.org/abs/hep-ph/9709356>

J. Wess & J. Bagger book on Supersymmetry and Supergravity

H.-P. Nilles Review on Supergravity: <https://inspirehep.net/literature/194173>;

<https://www.sciencedirect.com/science/article/pii/0370157384900085?via%3Dihub>

Grading: homework (50%), in-class presentation (50%)