

Advanced Quantum Field Theory

Winter 2015/2016

Course description: The course will cover advanced topics in Quantum Field Theory. The target audience are students who want to learn about quantum field theory beyond topics traditionally covered in TTP1 and TPP2. See the course syllabus on the next page.

Lectures: Prof. Kirill Melnikov (kirill.melnikov@kit.edu). Office hours: room 11/06, Monday, 10-11 am.

Exercises: Dr. Lorenzo Tancredi (lorenzo.tancredi@kit.edu) 11/08 ; Office hours: (send an e-mail or simply stop by)

Literature: We will follow, in part, the following books: a) M. Shifman ``Advanced Topics in Quantum Field Theory: a lecture course". b) V. Rubakov ``Classical theory of gauge fields"; c) A. Zee ``Quantum Field Theory in a nutshell" by A. Zee;

Lectures: Monday, 14.00-15.30 , Lehmann HS

Exercises: to be determined

Course Syllabus

Dates	Lecture
19/10/15 26/19/15	Kinks in two-dimensional field theory Kink quantization; kink mass at one loop
02/11/15 09/11/15	Fermions in the field of a kink; charge fractionalization Vortex solutions in U(1) gauge theories
16/11/15 23/11/15	Magnetic monopoles in SU(2) gauge theories Magnetic monopoles in SU(2) gauge theories
30/11/15 07/12/15	Tunneling in QFT; spontaneous pair creation in a constant electric field Decay of the false vacuum
14/12/15 21/12/15	Anomalies in the two-dimensional QED (the Schwinger model) Anomalies in QFT as an infra-red and/or an ultraviolet phenomenon
11/01/16 18/01/16	Large N limit of gauge theories Gravity as a field theory
25/01/16 01/02/16	Gravity as a field theory Lattice QFT
08/02/16	Lattice QFT