

Quantum Optics, Quantum  
Nanophysics &  
Quantum Information



**Guest lectures**  
**by**  
**Valentine Zakharov, MPI München**  
**&**  
**Henri Verschelde, Ghent University**

**Relativistic Quantum Field Theory**  
**Series of lectures from 13.04.2010 – 26.05.2010**  
**4 SWS/5 ECTS**

We give an introduction into relativistic quantum field theory, QFT as a low energy description of systems with infinitely many degrees of freedom, we describe interaction and Feynman diagrams in QED using propagator theory, we introduce symmetries and the gauge principle, we discuss spontaneous symmetry breaking for the Higgs mechanism of Yang-Mills fields and in the context of condensed matter physics (super fluidity and superconductivity), we give an introduction into QCD and into the standard model of electroweak interactions. The aim is to get familiar with the mathematical formalism of relativistic quantum fields, of gauge theories, the modern theories of theoretical physics, in particular in the view of recent developments.

Tuesdays, 13.4.2010 – 25.5.2010 / 15:00 – 18:00 hrs  
at the Christian Doppler lecture hall, Boltzmannngasse 5, 3<sup>rd</sup> floor, 1090 Wien, except for

Tuesday, 18.05.2010/15:00 – 17:00, alternative location at the Josef Stefan lecture hall,  
Boltzmannngasse 5, 3<sup>rd</sup> floor, 1090 Wien

Wednesdays, 14.4.2010 – 26.05.2010 / 15.00-18.00 hrs at the Josef Stefan lecture hall