# T 24: Quantenfeldtheorie 2

Convenor: Dominik Stöckinger

Zeit: Mittwoch 16:45–18:00 Raum: WIL-C129

T 24.1 Mi 16:45 WIL-C129

**Strong field effects on physics processes at the interaction point at linear colliders** — •Stefano Porto — II. Institut für Theoretische Physik Universität Hamburg Luruper Chaussee 149 22761 Hamburg Germany

Future linear colliders like ILC and CLIC could be powerful machines for the precision study of electroweak sector, as well as new physics Beyond the Standard Model. Due to the intense beams (high luminosity, high energy), strong fields may occur in the beam interaction region where the physical processes take place. The external fields would be up to 3 order of magnitude more intense than at LEP II and SLC. In the context of precision HEP, the presence of these strong fields may yield sensitive corrections to the observed electron-positron processes. Thus it's very important to understand how to deal with these intense external field corrections. Several theoretical methods are discussed and compared, like the Furry Picture method and a generalized quasi-classical operator method.

T 24.2 Mi 17:00 WIL-C129

**Exact solutions of particle wavefunctions in the Strong fields at the Interaction Point of future linear colliders** — •Anthony Hartin[1], Gudrid Moortgat-Pick[1,2], and Stefano Porto[2] — [1]DESY FLC, Hamburg, Germany — [2]Institute for Theoret. Physics, University of Hamburg, Germany

Planned, future linear colliders will collide intense charged particle bunches which exhibit very strong electromagnetic fields within which all physics processes take place. The field strengths seen by the relativistic particles can exceed the Schwinger critical field at which the vacuum is polarised. In contrast to previous and existing colliders in which the field strength is small enough to be neglected except in first order processes like Bremsstrahlung, the Furry interaction picture which utilises exact wavefunction solutions in the presence of the external fields, should be employed. Here we present new Furry picture solutions in the presence of two nearly anticollinear, constant crossed fields - those of the interacting bunches. These new solutions are used to calculate scattering cross-sections and are compared to those of the normal interaction picture.

T 24.3 Mi 17:15 WIL-C129

**A low-energy effective model for spacetime defects and the propagation of photons** — •Marco Schreck, Fabrizio Sorba, and Shiyamala Thambyahpillai — Institute for Theoretical Physics, Karlsruhe Institute of Technology, 76128 Karlsruhe, Germany

Even after several decades of research it has not been clarified how physics at the Planck scale exactly looks like. Since it is a formidable task to find the fundamental theory describing this physics, a reasonable approach is to consider effective theories holding at energies that are much smaller than the Planck energy.

We would like to pursue this idea and therefore we construct a simple model of spacetime fluctuations that are referred to as spacetime defects. Such defects are expected to play a major role at the Planck scale where spacetime may not be a smooth entity any more. In our model the spacetime defects are pointlike and they are embedded in Minkowski spacetime according to a Lorentz-invariant sprinkling process.

The question is how the propagation of photons is influenced by such spacetime defects, i.e. whether Lorentz invariance still holds. The photon is assumed not to interact directly with the defects, but the interaction is mediated by a scalar field. The interesting result is that under certain further assumptions the photon does not feel the defects and the photon dispersion relation remains standard. In this talk the model, the calculational methods, and the result will be presented and discussed.

T 24.4 Mi 17:30 WIL-C129

**Hadronic decays of tau-leptons in the extended Nambu – Jona-Lasinio model** — •Dmitriy Kostunin[1], Mikhail Volkov[2], and Andrey Arbuzov[2] — [1]Institut für Kernphysik, Karlsruhe Institute of Technology (KIT) — [2]Bogoliubov Laboratory of Theoretical Physics, Joint Institute for Nuclear Research (JINR), Dubna, Russia

Modern experiments have collected large statistics on tau-lepton decays and electron-positron annihilation into light hadrons. Therefore it is worthwhile to confront the experimental results with the corresponding theoretical predictions. The extended Nambu – Jona-Lasinio model is a good candidate for the theoretical description of these processes. Excited states of mesons in this version of the NJL model are described with the help of polynomial form-factors with minimal number of parameters. We worked out decays and cross-sections with $\pi\pi$, $\pi\pi(1300)$, $\omega\pi$, $\eta\pi$, $\eta'\pi$, $\eta\pi\pi$, $\eta'\pi\pi$ final states. Our calculations are in satisfactory agreement with the existing experimental results. Predictions for branching ratios of suppressed decays were obtained and compared with previous theoretical estimates.

T 24.5 Mi 17:45 WIL-C129

**Deformations in Quantum physics** — •Albert Much — MPI MIS, Leipzig, Deutschland

We consider deformations of quantum mechanical objects, and use the novel construction of warped convolutions for deformation. It turns out that through the deformation we are able to obtain several quantum mechanical effects where electromagnetic fields play a role. We understand the magnetic field as an object which is the outcome of strict mathematical deformation. Furthermore, we are able to obtain all magnetic fields by using this method of deformation. The results are used in quantum field theory to obtain an effective quantum plane.