



Sommerfeld Theory Colloquium

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Extreme Light and Quantum Fields

2015 is the International Year of Light, and of its purposes is “to raise awareness of optical technologies”. One such technology, high-power lasers of the petawatt class and beyond, provides the most intense light sources created by humankind so far. The intensities and field strengths in question are in excess of 10^{22} W/cm² and 10^{14} V/m, respectively magnitudes that correspond to concentrating the total solar radiation on a pinhead. This talk will present an overview of the uses and consequences of such extreme environments within the realm of particle physics. The relevant theory is strong-field QED, with the laser beams providing a rather peculiar electromagnetic background field. The magnitudes above are such that a nonperturbative treatment of the background becomes a necessity. Using appropriate theoretical tools, a number of phenomena will be addressed, including radiation reaction, nonlinear Thomson/Compton scattering, laser-stimulated pair production and photon-photon scattering. A particular incarnation of the latter, polarisation flip forward scattering, or vacuum birefringence, will be discussed in some detail, with an outlook on a planned experiment at the European XFEL at DESY.

Wednesday, 17 June 2015, 16:15h, Room A348/349, Theresienstr. 37/III

Prof. H. Ruhl