

# Seminar

*ifa* Institutul de Fizică Atomică

## **PULSE and IMPULSE of ELI**

*(Extreme Light Infrastructure)*

### **VI: Electron-Positron Pairs Created from Vacuum by External Fields**

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An external classical field of electromagnetic radiation gives rise to electron-positron pairs in a macroscopic (limited) piece of vacuum. The pairs are macroscopic in number, quasi-localized and appear and disappear (recombine) continuously in a stationary regime, reached under the action of both the external field and their own polarization field. The (coupled, non-linear) equations of motion for the amplitudes of creation or destruction are solved in the classical limit. For the highest, reasonably imagined, energies the pairs move slowly, are quasi-localized and acquire quasi-stationary single-particle states with an (extremely low) energy, spatially modulated. Due to the stationary dynamics the polarization electric field is vanishing. The polarized vacuum is only magnetized, and its (extremely low) magnetic susceptibility and refractive index (close to unity in the extremum) are computed. Nothing happens beyond the so-called Schwinger limit, had it ever be attained, and no New Physics lies therein. The physical effects are extremely low, because the interaction is governed by the small Compton wavelength.

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