

Stimulated Vacuum Emission and Photon Decay in Strong Electromagnetic Backgrounds

I A ALEKSANDROV^{1,2}, G PLUNIEN³, AND V M SHABAEV¹

¹*St.-Petersburg State University, 7/9, Universitetskaya Emb., 199034, St.-Petersburg, Russia.*

Contact Phone: +78123264963

²*Ioffe Physical-Technical Institute, 26, Politekhnicheskaya, 194021, St.-Petersburg, Russia.*

Contact Phone: +78122972245

³*Institut für Theoretische Physik, TU Dresden, 13, Mommsenstrasse, 01062, Dresden, Germany.*

Contact Phone: +493514630

Contact Email: i.aleksandrov@spbu.ru

According to quantum electrodynamics (QED), the interaction between the quantized electron-positron field and a classical electromagnetic background may give rise to various remarkable phenomena which are prohibited in the zero-field case. This study is devoted to the theoretical analysis of vacuum photon emission in the presence of strong external fields. The main focus is on the role of additional photons in the initial state. It is demonstrated that the initial quanta lead to additional radiation from the vacuum, which can be viewed as stimulated photon emission similar to the well-known process in atomic physics. Besides, the initial photon can decay into an electron-positron pair analogously to atomic absorption. We discuss the interplay between these two processes and the possibility of detecting the additional photon signal within experimental studies of the strong-field QED phenomena.