On the Role of Photon Statistics in Multiphoton Processes

S Varro[1]

[1] *Quantum Optics and Quantum Information, Wigner Research Centre for Physics, 29-33 Konkoly-Thege M. ut., 1121, Budapest, Hungary. Contact Phone: +36-1-392-2635*
Contact Email: varro.sandor@wigner.hu

The high-intensity light pulses used in multiphoton experiments come from amplifiers, and these pulses contain quite strong (unwanted) 'pre-pulses' or 'pedestals'. The main source of the pedestal is said to be the amplified spontaneous emission (ASE) of the amplifying medium. Since the photon statistics of the ASE are different from that of the main pulse, the study of multiphoton processes taking place in a pedestal or in a mixed field may be interesting, both in theory and in experiments. Besides, in the last couple of years, quantum optical and statistical considerations have received increasing attention in the investigations of high-order processes, even in attosecond physics [1-7]. On the basis of semiclassical and quantum optical [7,8] considerations, we shall attempt to assess the possible role of photon statistics in laser-assisted electron scattering and ionization in the field of a pedestal or in a mixed field. In the semi-classical description, the mixed fields have been taken as coherent superpositions of a deterministic (coherent) part and a Gaussian stochastic component (noise). In the quantum optical treatment, the mixed field has been modelled by the so-called thermo-coherent states.

References

[1] N Tsatrafyllis, S Kühn, M Dumergue, P Foldi, S Kahaly, E Cormier, I A Gonoskov, B Kiss, K Varju, S Varro and P Tzallas, Phys. Rev. Lett. **122**, 193602 (2019)

[2] V A Antonov, K Ch Han, T R Akhmedzhanov, M Scully and O Kocharovskaya, Phys. Rev. Lett. **123**, 243903 (2019)

[3] Al Gorlach, O Neufeld, N Rivera, O Cohen and I Kaminer, Nat. Commun. **11**, 4598 (2020)

[4] B A Zon and A S Kornev, Opt. Spectrosc. **128**, 1425 (2020)

[5] P Földi, I Magashegyi, Á Gombköto and S Varró, Photonics **8**, 263 (2021)

[6] Á Gombkötő, P Földi and S Varró, Phys. Rev. A **104**, 033703 (2021)

[7] S Varró, Photonics **8**, 269 (2021); DOI:10.3390/photonics8070269

[8] S Varró, New J. Phys. **24**, 053035 (2022)