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Gailitis-Damburg oscillations in the three-body atomic systems

Tuesday, 24 September 2024 17:00 (30 minutes)

The Gailitis-Damburg oscillations are the near threshold singularities of cross-sections of reactive scattering predicted to exist in some atomic systems [1, 2, 3]. Namely, above the threshold of excited state of neutrally charged atom an infinite series of logarithmically spaced maxima and minima of cross-section can arise. Although this phenomenon was predicted in the early 1960s, there is no strong experimental confirmation and only a few recent computational studies devoted to improving the conditions of experiments with antimatter have observed the signs of it [4, 5, 6].

We present the results of our theoretical study of the behavior of cross sections of low-energy scattering in the systems e+pe- and e-pe-. Our computational experiment is based on solution of the Merkuriev-Faddeev equations in the total orbital momentum representation [7, 8] and the recently obtained original theoretical results on the wave function asymptote for the three-body Coulomb system in the presence of particle-atom dipole potential [9]. The latter is critically important for obtaining the reliable results at sufficiently small above threshold energies [10]. We have observed the existence of the Gailitis-Damburg oscillations in the partial cross sections [11]. Surprisingly, some of the obtained results contradict the theory of Gailitis and Damburg. We discuss it in our talk.

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