# ENERGY APPROACH TO QED THEORY OF CALCULATION OF POSITRON IMPACT IONIZATION OF MULTIELECTRON ATOMS

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Considered will be processes, which lead to single (outer shell) ionization of the multielectron atom. Positron impact can lead to ionization via two reaction channels usually called break up (of the atom into an electron and ion) and transfer (of one atomic electron to the projectile to form positronium. The most accurate positron ionization cross sections for example, for helium are presented in [1] and analysed in comparison with that for electron impact ionization. Note that the features of particular interest are the merging of the cross sections above 600 eV when the first Born approximation is valid, the positron cross section exceeding the electron cross section at medium energies and a cross over of the cross section curves near threshold [1]. We suppose that a uniform theoretically comprehensive approach to the whole problem is needed. The most consistent approach to considered problems solving must base on the quantum electrodynamics (QED). In this paper the energy approach (gauge invariant formulation [2]) is used for consistent QED description of positron and electron collision (ionization) processes. As example we consider the positron impact ionization of He. We consider $a_{in}^{+}F_0$ as the initial state. In general form a scattered part for imaginary energy shift $ImdE$ appears at first in the second order of the atomic perturbation theory in the form of integral over the scattered positron energy $e_{sc}$: $\grave{o}de_{sc}G(e_{iv},e_{ie},e_{in},e_{sc})/(e_{sc}-e_{iv}-e_{ie}-e_{in}-i0)$ with $ImdE=pG(e_{iv},e_{ie},e_{in},e_{sc})$. Here $e_{in}$ *and* $e_{sc}$ are the incident and scattered energies respectively to the incident and scattered positron; $G$ is a definite squired combination of the Coulomb and Breit inter particle interaction integrals [3]. We use further the optimized basis's of Dirac orbitals, which is got from minimization principle for contribution of the fourth QED perturbation theory diagrams to the imaginary part of energy shift, i.e., radiative width of atomic level [2]. Our atomic numerical code [2,3] is used. Preliminary results on positron impact ionization cross-section ($Å^2$) for helium are presented in table below and compared with results: A-Knudsen etal and B-Bielefeld (c.f.[1]).

| Impact energy, eV | Measured/ A | Measured/ B | Calculated/ Present |
|---|---|---|---|
| 50 | 0,23 | 0,29 | 0,24 |
| 100 | 0,52 | 0,45 | 0,51 |
| 200 | 0,45 | 0,40 | 0,46 |

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