

XXV International Baldin Seminar on High Energy Physics Problems  
"Relativistic Nuclear Physics and Quantum Chromodynamics"



XXV International Baldin Seminar  
on High Energy Physics Problems  
*Relativistic Nuclear Physics & Quantum Chromodynamics*

September 18 - 23, 2023, Dubna, Russia

Contribution ID: 12

Type: **not specified**

## Contributions of QED diagrams with vacuum polarization insertions to the lepton anomaly within the Mellin-Barnes representation

*Thursday, 21 September 2023 16:30 (20 minutes)*

The contributions to the lepton magnetic moment anomaly,  $a_L = (g - 2)_L/2$ ,  $L = e, \mu$  and  $\tau$ , generated by a specific class of QED diagrams are obtained explicitly up to the tenth order of the electromagnetic coupling constant. Calculations are performed within the Mellin-Barnes integral representation, which is widely used in consideration of multi-loop diagrams. The corresponding analytic expressions are expressed as functions of the lepton mass ratios,  $r = m_\ell/m_L$  in the whole range of  $r$ ,  $0 < r < \infty$ . Our analytic expressions and their asymptotic expansions are compared with the known results available in the literature. Exact analytic expressions for the mass dependent coefficients  $A_{2,L}^{(10)}(r)$  from the diagrams with insertions of four identical lepton loops are obtained and investigated in detail for the first time. It is shown that approximate expansions can be successfully used for reliable estimates of the corresponding radiative corrections in a large range of  $r$  ( $0 < r < 0.2$  for  $r < 1$  and  $2 < r < \infty$  for  $r > 1$ ).

**Primary authors:** Prof. KAPTARI, Leonid (JINR); Dr LASHKEVICH, Vasil (GSTU); Dr SOLOVTSOVA, Olga (JINR&GSTU)

**Presenter:** Dr SOLOVTSOVA, Olga (JINR&GSTU)

**Session Classification:** Parallel: Structure functions of hadrons and nuclei