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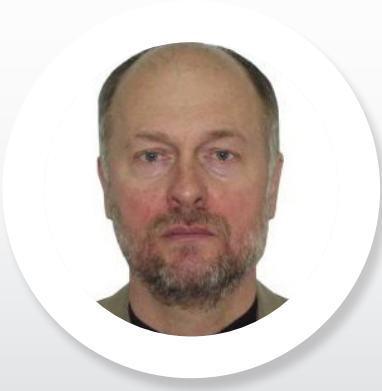

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New faces of correspondence principle in high energy spin physics

Despite the formal disappearance of spin in classical limit n⇒0 the concept of classical charged magneton found numerous applications in high energy physics of polarized beams. The radiation effects such as spin light and radiative polarization (RP) are usually treated as being purely quantum in nature. Nevertheless, the analysis of Novosibirsk 1984-year experiment have shown that full understanding of spin light phenomenon could be achieved through the use of classical Frenkel model (FM). Within the given approximations the principal deviation of FM from the widely used Bargmann–Michel-Telegdi model lies in the field-dependent addition to the electron mass. The latter is responsible for the unusual sign of the spin contributions to the rate and power of synchrotron radiation. This inertial spin effects seems to be a universal property of the charged magneton-type systems. The wide class of the models descriptive of those systems employs the Grassmann algebra to represent (pseudo) classical spin degrees of freedom. We show that spin and trajectory equations of FM could be reconciled with the appropriate equations of pseudoclassical Berezin–Marinov model after the procedure of averaging over Grassmann variables have been applied. Within a classical approach we give also a brief discussion of RP phenomenon considering its possible relation to 'circular Unruh effect'.

Biography

S L Lebedev has completed his graduation from Physical School of Dnepropetrovsk State University (Ukraine), and PhD from P N Lebedev Physical Institute of Russian Academy of Sciences (FIAN). He is an Associated Professor at Surgut State University (Russian Federation), and Director of Research Team focusing on Quantum Electrodynamics and High Energy Phenomena.

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