Commentary
Volume 9:3, 2021

Journal of Astrophysics & Aerospace Technology

ISSN: 2329-6542 Open Access

Dynamics of Relativistic Electrons in Magnetic Fields and in Quantum Computing

Nikolaus Rajewsky*

Department of Space Technology, Debre Tabor University, Debre, Ethiopia

About the Study

We study the two-dimensional motion of relativistic electrons when confined in a magnetic field with spatial power fluctuations. Its effects include the reversal of degeneracy that occurs in the case of a constant magnetic field, and the special alignment of Landau levels of spin-up and spin-down electrons depending on whether the magnetic field increases or decreases from the center. The division of the Landau level of an electron by the change of the equation of the zero angular momentum of the positive one and the state of matter. Landau Quantization (LQs) in variable magnetic fields has interdisciplinary applications in a variety of fields, from condensed matter physics to quantum information. As an example of, we will explain the increase in the quantum velocity of an electron in the presence of a spatially increasing magnetic field. And the achievement of the super-Chandrasekhar mass of the white dwarf by taking LQ and Lorentz force into consideration at the same time.

Landau Quantization (LQ) is a phenomenon in which the cyclotron orbit of a charged particle is quantized in the presence of a magnetic field. LQ has been widely discussed for uniform magnetic fields in both non-relativistic 1 and relativistic cases. This has many interesting effects such as the quantum Hall effect, the De Haas-Van Alphen effect, the Schubnikov oscillation, the modification of the equation of state (EOS), and the change in the neutron drop line. The modified EOS was later found to help explain the mass of the Super Chandrasekhar white dwarf.

However, a perfectly uniform magnetic field is an ideal realization. What if it is non-uniform, like an astrophysical system or plasma? The magnetic field changes dramatically from the center to the surface, even for white dwarfs, neutron stars, and even main sequence stars. Plasma can act as a source of both an increase and a decrease in the magnetic field, depending on its properties. Magnetic field fluctuations are also common in the laboratory. This will begin the study of relativistic electron dynamics in the presence of strictly spatially changing magnetic fields.

Various arrangements of electron energy levels when electrons are confined in a variable magnetic field. In addition, we investigate its application in the field of quantum information by showing the spatially increasing magnetic field in a magnetized white dwarf and the increase in the quantum velocity of electrons in the presence of astrophysics. When the Zeeman effect is included, the degenerate decay that occurs in a uniform magnetic field occurs with increasing and decreasing magnetic fields. However, the direction of the levels of spin-up and spin-down electrons is completely different.

Conclusion

In general, non-uniform magnetic field LQs can be useful in several areas of physics, from quantum information to condensed matter physics. Here, we will explain the quantum information by increasing the quantum velocity of electrons and the application of Super Chandrasekhar to astrophysics of white dwarfs. The quantum velocity of a particle is defined as the velocity of the transition from one energy level to another. It directly affects the processing speed of quantum information. The electron level corresponds to the qubit of quantum information. Therefore, the faster the transition between levels, the faster the change between qubits and the faster the processing of quantum information. Therefore, achieving higher quantum velocities is one of the main requirements of researchers in the field of quantum computation.

How to cite this article: Rajewsky, Nikolaus. "Dynamics of Relativistic Electrons in Magnetic Fields and in Quantum Computing." *J Astrophys Aerospace Technol* 9 (2021) : 180.

***Address for Correspondence:** Nikolaus Rajewsky, Department of Space Technology, Debre Tabor University, Debre, Ethiopia, Tel: +251931773823; E-mail: rajskynikol@gmail.com*

Received: October 04, 2021; **Accepted**: October 18, 2021; **Published**: October 25, 2021