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Holographic Schwinger effect and the energy loss of quarks in the magnetized background

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We study the magnetic field effect on the Schwinger effect and the energy loss of quarks using the AdS/CFT correspondence. The potential analysis of particle pairs transverse and parallel to the magnetic field is performed in this paper. Firstly, we calculate separating length of the particle pairs at finite temperature with magnetic field. It is found that the maximum value of separating length decreases with the increase of magnetic field and/or temperature , which can be inferred that the virtual electron-positron pairs become real particles more easily . In the further investigation of the effect of magnetic field and temperature, we find the magnetic field and temperature reduce the potential barrier, thus favor the Schwinger effect . When particle pairs are transverse to the magnetic field, the effect of the magnetic field on the Schwinger effect is slightly larger than the parallel case. The difference between the transverse and parallel case becomes smaller with the increase of temperature. It indicates that the high temperature would reduce the anisotropic effect induced by the magnetic field. The effects of a magnetic field on energy loss when moving perpendicular to the magnetic field direction are larger than moving parallel to the magnetic field direction, which implies that the magnetic field tends to suppress more quarks and jets when moving in the transverse direction than in the parallel direction.

Publications

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