

An investigation of Aharonov-Bohm effect towards the potential use for the gravitational wave detection

We investigate an alternative way to detect the gravitational wave using the concept of Aharonov-Bohm experiment in curved space-time. Our system consists of an electron beam which is split into two beams passing opposite sides of the solenoid and producing interference patterns. The change in interference patterns can be observed if the system is perturbed by the gravitational wave, and can be used to trace back to the nature of the gravitational wave. This system is described by the cylindrical coordinate in Minkowski spacetime where we set the incoming wave propagating in the z-direction, perpendicular to the solenoid's cross section. We found that the perturbation on the cross section area due to gravitational strength is not significant enough to change the phase shift. Contrarily, by changing the magnetic field generated by the current inside the solenoid, the results suggest that the significant phase shift could potentially be detected if the gravitational wave is allowed to propagate in the direction that is perpendicular to z-direction.

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