The time-dependent Aharonov-Bohm effect[1] DOUGLAS SINGLE-TON, California State University, Fresno, ELIAS VAGENAS, Research Center for Astronomy and Applied Mathematics, Academy of Athens — We discuss two possible covariant generalizations of the Aharonov-Bohm effect - one expression in terms of the space-time line integral of the four-vector potential and the other expression in terms of the space-time "area" integral of the electric and magnetic fields written in terms of the Faraday 2-form. These expressions allow one to calculate the Aharonov-Bohm effect for time-dependent situations. In particular, we use these expressions to study the case of an infinite solenoid with a time varying flux and find that the phase shift is zero due to a cancellation of the Aharonov-Bohm phase shift with a phase shift coming from the Lorentz force associated with the electric field, E = - dA/dt, outside the solenoid. This result may already have been confirmed experimentally.

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