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ELECTROMAGNETIC EFFECTS ON THE QCD COUPLING

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Strong magnetic fields can be found in all systems where we believe the quark-gluon plasma is formed, such as the early universe, compact stars, and heavy-ion collisions. The most intense magnetic field estimated in the lab is in non-central heavy-ion collisions, which can reach up to 10^{19} G. The scale of the strong interaction is much larger than the electromagnetic interaction, and the latter is usually suppressed. However, in cases where the intensity of the fields is very high, electromagnetic effects may influence strongly interacting matter. The goal of the project is to perform a renormalization group approach to estimate the QCD beta function in an electromagnetic background at one loop.
In this talk, I will focus on how a background magnetic field modifies the dispersion of fermions, leading to the quantization of energy levels known as Landau levels. I will show how these modifications affect the fermionic propagator, self-energy, and vertex function in quantum electrodynamics.

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