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Magnetogenesis via plasma processes

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Spontaneous magnetic field generation, or magnetogenesis, is an important process in both cosmological and astrophysical contexts. In plasma physics, it is well known that dynamo processes can amplify a given magnetic field, but how the required seed magnetic field is spontaneously generated is relatively less understood. Here I present via analyzing the equation of motion of a magnetized fluid that a term due to the pressure tensor is responsible for seed magnetogenesis in a collisionless plasma. In relativistic regimes, there is an additional term due to a non-commutative relationship between momentum and velocity that further affects magnetogenesis.

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