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Magnetic monopoles in cosmic magnetic fields: acceleration and constraints

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Magnetic monopoles are intriguing hypothetical particles and inevitable predictions of theories of Grand Unification. They should be produced during phase transitions in the early universe, but also mechanisms like the Schwinger effect in strong magnetic fields could contribute to the monopole number density. We show how from the detection of intergalactic magnetic fields we can infer additional bounds on the magnetic monopole flux, and how even well-established limits, such as Parker bounds and limits from terrestrial experiments, strongly depend on the acceleration in cosmic magnetic fields. We also discuss the implications of these bounds for minicharged monopoles and magnetic black holes as dark matter candidates. Finally, we apply our primordial bounds to monopoles produced by the primordial magnetic fields themselves through the Schwinger effect, deriving necessary conditions for the survival of the primordial fields.

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