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Electromagnetic superconductivity of vacuum in strong magnetic field and heavy ion collisions

Recently, we have suggested that the vacuum in a strong external magnetic field experiences a spontaneous phase transition to an electromagnetically superconducting state. The unexpected superconductivity of, basically, empty space is induced by emergence of quark-antiquark vector condensates with quantum numbers of electrically charged rho mesons. The ultra-periferal heavy-ion collisions generate high magnetic fields which may be used as an experimental tool to probe the existence of the electromagnetic superconductivity of the cold vacuum. In our talk we discuss potentially observable signatures of vacuum instability towards the exotic superconducting state.

Primary author: Dr CHERNODUB, Maxim (University of Tours, France)

Presenter: Dr CHERNODUB, Maxim (University of Tours, France)

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