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Baryon and lepton asymmetry of the Universe in the left-right asymmetric model of weak interaction

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The formation of the Universe's baryon and lepton asymmetries is examined within the framework of a left-right asymmetric model of weak interaction. The presence of a right-handed vector boson admixture—with mixing angles of opposite signs for W^- and W^+ —results in differing lifetimes for neutrons and antineutrons, which decay via W^- and W^+ , respectively. This difference gives rise to baryon asymmetry during the hadronization of quark-gluon plasma at temperatures below 150 MeV. The formation of lepton asymmetry in the left-right model is linked to the presence of sterile (right-handed) neutrinos; these do not thermalize and instead escape the cosmic plasma, carrying away a lepton asymmetry that is opposite in sign to the baryon asymmetry. Overall, a baryon-lepton asymmetry emerges while the difference between baryon and lepton numbers ($B - L$) is conserved. The potential for enhancing the experimental precision of neutron decay asymmetry measurements is noted as a means to increase the confidence level in substantiating the left-right asymmetric model of weak interaction.

Primary author(s) : SEREBROV, Anatolii (NRC "Kurchatov Institute" - PNPI)

Presenter(s) : SEREBROV, Anatolii (NRC "Kurchatov Institute" - PNPI)

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