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Minimal sterile neutrino dark matter

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We propose a novel mechanism to generate sterile neutrinos ν_s in the early Universe, by converting ordinary neutrinos ν_α in scattering processes $\nu_s \nu_\alpha \rightarrow \nu_s \nu_s$. After initial production by oscillations, this leads to an exponential growth in the ν_s abundance. We show that such a production regime naturally occurs for self-interacting ν_s , and that this opens up significant new parameter space where ν_s make up all of the observed dark matter. Our results provide strong motivation to further push the sensitivity of X-ray line searches, and to improve on constraints from structure formation.

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