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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 sterile neutrino abundance. We show that such a production regime naturally occurs for self-interacting sterile neutrinos, and that this opens up significant new parameter space where sterile neutrinos 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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