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Dark Matter from Exponential Growth: Pandemic Dark Matter

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We propose a novel mechanism for the production of dark matter (DM) from a thermal bath, based on the idea that DM particles χ can transform heat bath particles ψ: $\chi\psi \to \chi\chi$. For a small initial abundance of χ this leads to an exponential growth of the DM number density. We demonstrate that this mechanism complements freeze-in and freeze-out production in a generic way, enabling new possibilities to explain the observed DM abundance. After this general discussion we comment on connections to discrete symmetries and consider possible model realizations as well as observational prospects. In particular for sterile neutrinos we show that an exponential production regime naturally occurs for self-interacting sterile neutrinos, which opens up significant parameter space for sterile neutrino DM in a very simple model.

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