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Freeze-In at Strong Coupling in a Z'-Mediated Dark Matter Scenario

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We present a freeze-in production mechanism for fermionic dark matter mediated by a Z' gauge boson. Freeze-in is typically a production mechanism for FIMPs. However, if the temperature of the Standard Model (SM) thermal bath never exceeds the dark matter mass, we enter a regime of Boltzmann-suppressed production. This allows for stronger couplings in a freeze-in scenario, reaching gauge couplings of up to order one. In this context, current and future direct detection dark matter experiments play a crucial role in constraining the model.

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