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A theoretical framework for multicomponent dark matter

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We show that a single Z_N symmetry, which may be a remnant of a spontaneously broken $U(1)$ gauge symmetry, allows to simultaneously stabilize several dark matter particles. We systematically study scenarios with various scalar fields charged under a Z_N and find that it is possible to get two ($N \geq 4$), three ($N \geq 6$), four ($N \geq 8$), or even more dark matter (stable) particles. A generic feature of these models is that the number of stable particles is not determined by the model but depends on the relation between the masses of the different fields.

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