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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.

Primary author: E. YAGUNA, Carlos

Presenter: E. YAGUNA, Carlos