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Multi-Component Dark Matter from Minimal Flavor Violation

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Various experiments have confirmed with good accuracy that all flavor violating phenomena are consistent with the predictions in the Standard Model (SM) of particle physics. This empirical fact encourages us to construct new physics models based on the assumption of the Minimal Flavor Violation (MFV), which dictates that new physics interactions respect a quark flavor symmetry with the only breaking source arising from the quark Yukawa matrices. Formally, the MFV structure is achieved by promoting the quark Yukawa matrices to spurious fields non-trivially transforming under the quark flavor group.

Remarkably, it is shown that this MFV hypothesis guarantees the stability of the lightest component of a new colorless field that non-trivially transforms under the quark flavor group, thereby providing a good dark matter (DM) candidate. In this presentation, I will demonstrate that within this MFV framework, the heavier components of such a flavored field can also constitute a significant part of DM. As a benchmark, we consider a gauge singlet flavored scalar and show that the heavier components have a long enough lifetime to be DM in a parameter region. We also discuss testability of such multiple DM candidates at experiments.

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