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Scalar potential analysis of the Z5 multi-component dark matter model

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In recent years the multi-component scalar dark matter models with discrete symmetries $\mathbb{Z}_N$ have been widely studied in the literature. Among them, the $\mathbb{Z}_5$ model proposes two complex fields that transform as singlets under the Standard Model gauge group. The scalar potential brings along with eleven free parameters that must be restricted. In that sense, the primary purpose of this research is to develop a detailed analysis of the scalar potential with the objective of establishing the perturbative unitarity, vacuum stability, and positivity conditions, and finally to determine the viable parameter space of the model.

Authors: RIOS PEREZ, DIEGO ALEJANDRO; ZAPATA, Oscar

Presenter: RIOS PEREZ, DIEGO ALEJANDRO

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