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Dark matter models with Higgs portal to multicomponent dark sector

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We consider multi-component dark sector, where the heavier dark particles have stronger couplings to the scalar mediators and may be copiously produced at colliders. These heavier particles then decay to the dark matter (DM) plus standard model (SM) particles outside the detectors, thus behaving as DM imposters at colliders. In a such case, there is no longer tight correlation between the DM direct detection and collider searches, thereby widely opening a new window for DM model building and phenomenology. We construct two explicit models, one for fermionic DM and the other for vector DM, and study various DM phenomenolgy including collider signatures.

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