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Probing dark matter interactions below the neutrino floor with PopIII stars

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The mere observation of the first stars (Pop III stars) in the universe can be used to place tight constraints on the strength of the interaction between dark matter and regular, baryonic matter. We apply this technique to a candidate Pop III stellar complex discovered with the HubbleSpace Telescope at z~7 and find some of the deepest bounds to-date for both spin-dependent and spin-independent DM-nucleon interactions, over a large swath of DM particle masses. Additionally, we show that the most massive Pop III stars could be used to bypass the main limitations of direct detection experiments: the neutrino background to which they will be soon sensitive

Summary

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