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Heavy dark matter in the first stars

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The capture of dark matter by astrophysical compact objects has been of great interest in recent years. In this talk, we present the capture of heavy dark matter by Population III stars at both the early and late stages of their evolution. In the early phase, we calculate dark matter capture via multiple scatterings of the dark matter with two different target species. For the late stage, we consider multiple collisions with three different target elements. Rather than using constant values for the escape velocities and target number densities, we use radial profiles obtained from MESA simulations, which include a rich core-atmosphere structure for the late star. We also incorporate attenuation effects beyond the optically thin limit and model a response function for the hydrogen target, which was unavailable in early studies.

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