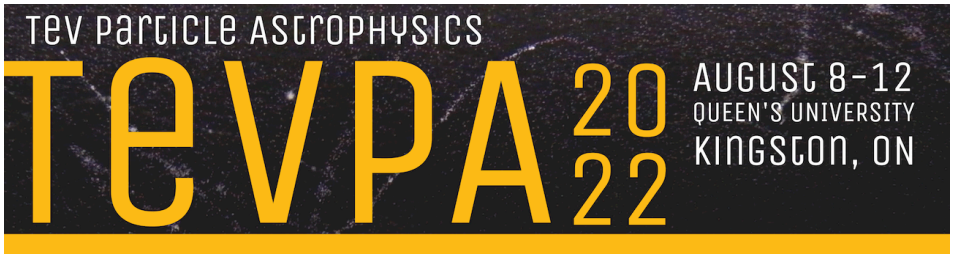

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Hidden dynamics of a sub-component dark matter

Tuesday, 9 August 2022 16:30 (20 minutes)

We emphasize the distinctive cosmological dynamics in multi-component dark-matter scenarios and its impact in probing a sub-dominant component of dark matter.
The dynamics originates from the conversion among different dark-matter components.
We find that the temperature of the self-interacting sub-component dark matter is significantly enhanced by the dark-matter annihilation into the sub-component.
The same annihilation sharply increases the required annihilation cross section for the sub-component as we consider a smaller relative abundance fraction among the dark-matter species.
Because of the enhanced temperature and annihilation cross section of the sub-component, contrary to a naive expectation, it can be easier to detect the sub-component with smaller abundance fractions in dark-matter direct/indirect-detection experiments and cosmological observations.
Combining with the current results of accelerator-based experiments, the abundance fractions smaller than 10 % are strongly disfavored;
we demonstrate this by taking a dark photon portal scenario as an example.
Nevertheless, for the abundance fraction larger than 10 %, the warm dark-matter constraints on the sub-dominant component at sub-GeV mass scale can be complementary to the parameter space probed by accelerator-based experiments.

Collaboration name

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