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Dark gauge bosons in neutron stars

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In the presence of a feebly-interacting light particle, its signal might leave an imprint on astrophysical observations so one could obtain meaningful constraints on a parametric space. In this talk, I will discuss additional light gauge boson (so called dark gauge boson) cooling of neutron stars and its implications. With the rigorous treatment of the effective field theory prescription and the thermal effect, the relevant couplings of dark gauge bosons to hadrons in medium is derived. Taking into account the several observed data (e.g., the time duration of the neutrino flux of SN1987A, the predicted location of the compact object in the remnant of SN1987A with its inferred x-ray luminosity, and the x-ray point-like source in Cassiopeia A) that match well with the cooling simulations based on the null hypothesis, I will show the implied meaningful constraints on some gauged $U(1)$ extensions of the Standard Model.

Summary

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