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Multi-messenger lifetime constraints on heavy decaying dark matter

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Dark matter is one of the ingredients of the standard cosmological model although we do not know its fundamental nature. Huge effort has been made in order to perform a direct detection of this dark matter component but up to now we have only seen it interacting gravitationally. In this regard the indirect detection is a promising method to search for dark matter, where we try to look at signatures of the dark matter on the astrophysical messengers, such as gamma-rays and neutrinos.

Heavy dark matter with $m_{\text{DM}} > 10^7$ GeV leads to higher fluxes in the decaying scenario rather than the annihilating one. In this work we focus on heavy decaying dark matter particles and we revisit the dark matter lifetime bounds placed by the gamma-ray measurements by means of the spectra provided by the recent code HDMSpectra. We provide lifetime limits for dark matter particles with $m_{\text{DM}} = [10^7 - 10^{15}]$ GeV for a set of decay scenarios, where we take into account their neutrino and gamma-ray production.

Primary authors: FIORILLO, Damiano (Niels Bohr Institute, Copenhagen); MIELE, Gennaro; CHIANESE, Marco; SAVIANO, Ninetta; HAJJAR MUÑOZ, Rasmi (SSM - IFIC (CSIC-UV)); MORISI, Stefano (Università federico II Napoli)

Presenter: HAJJAR MUÑOZ, Rasmi (SSM - IFIC (CSIC-UV))

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