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ILC beam dump experiment and new physics search

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We study capability of the ILC beam dump experiment to search for new physics, comparing the performance of the electron and positron beam dumps.
Firstly, the dark photon, axion-like particles, and light scalar bosons are considered as new physics scenarios. We find that the ILC beam dump experiment has higher sensitivity than past beam dump experiments, with the positron beam dump having slightly better performance for new physics particles which are produced by the electron-positron pair-annihilation.
We also propose an experimental setup to search for sub-GeV dark matter, the Beam-Dump eXperiment at the ILC (ILC-BDX). We study the production, decay and scattering of sub-GeV dark matter particles in several models with a dark photon mediator. Taking into account beam-related backgrounds due to neutrinos produced in the beam dump as well as the cosmic-ray background, we evaluate the sensitivity reach of the ILC-BDX experiment. We find that the ILC-BDX will be able to probe interesting regions of the model parameter space and, in many cases, reach well below the relic target.
This talk is based on the following papers: arXiv: 2105.13768 [hep-ph] and 2301.03816 [hep-ph].

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