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Extending the reach of FASER, MATHUSLA, and SHiP towards smaller lifetimes using secondary particle production (12'+3')

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Many existing or proposed intensity-frontier search experiments look for decay signatures of light long-lived particles (LLPs), highly displaced from the interaction point. This approach is, however, limited to new particles with decay lengths similar to or larger than the baseline of those experiments. We will discuss how this basic constraint can be overcome in BSM models that go beyond the simplest scenarios due to additional secondary production of LLPs right in front of the detector. This way a new lifetime regime can be probed. We illustrate the prospects of such searches in the future experiments FASER, MATHUSLA, and SHiP. We also analyze additional advantages from employing dedicated neutrino detectors placed in front of the main decay volume.
The talk is based on https://arxiv.org/pdf/1911.11346.pdf

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