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Search for Long-Lived Particles at the Future FCC-ee

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The electron-positron stage of the Future Circular Collider, FCC-ee, is a frontier factory for Higgs, top, electroweak, and flavour physics. It is designed to operate in a 100 km circular tunnel built at CERN, and will serve as the first step towards ≥ 100 TeV proton-proton collisions. In addition to an essential and unique Higgs program, it offers powerful opportunities to discover direct or indirect evidence of physics beyond the Standard Model. Direct searches for long-lived particles at FCC-ee could be particularly fertile in the high-luminosity Z run, where 5×10^{12} Z bosons are anticipated to be produced for the configuration with two interaction points. The high statistics of Higgs bosons, W bosons and top quarks in very clean experimental conditions could offer additional opportunities at other collision energies. Three physics cases producing long-lived signatures at FCC-ee are highlighted and studied in this talk: heavy neutral leptons (HNLs), axion-like particles (ALPs), and exotic decays of the Higgs boson. These searches motivate out-of-the-box optimization of experimental conditions and analysis techniques, which could lead to improvements in other physics searches.

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