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Toward a search for axionlike particles at the LNLS

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Axionlike particles (ALPs) appear in several dark sector studies. They have gained increasing attention from the theoretical and experimental community. In this work, we propose the first search for ALPs to be conducted at the Brazilian Synchrotron Light Laboratory (LNLS). In this work, we derive the projected sensitivity of a proposed experiment for the production of ALPs via the channel eþe− → aγ. We show that such an experiment could probe ALP masses between 1–55 MeV, and ALP-electron couplings down to gaee ¼ 2–6 × 10−4 GeV−1 depending on the energy beam, thickness of the target, and background assumptions. Therefore, this quest would cover an unexplored region of parameter space for experiments of this kind, constitute a promising probe for dark sectors, and potentially become the first Latin-American dark sector detector.

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