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Search for hidden particles in intensity frontier experiments

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Despite the undeniable success of the Standard Model of particle physics (SM), there remain several phenomena, such as neutrino oscillations, the baryon asymmetry of the Universe, and dark matter, that the SM fails to explain. These phenomena clearly indicate the need for an extension of the SM, most likely involving new particles beyond its current framework. However, there is also a possibility that there are new particles in hidden sectors of the SM unrelated to solving these problems.

Numerous experiments are being conducted in the search for new physics, and they are generally categorized into two main approaches: the energy frontier and the intensity frontier. The energy frontier involves attempts to directly produce and detect heavy new particles at high-energy accelerators. In contrast, the intensity frontier focuses on the production and detection of light new particles that interact only feebly with Standard Model particles.

This work discusses the future SHiP (Search for Hidden Particles) experiment at the CERN SPS, which belongs to the intensity frontier program. The advantages and technical features of the SHiP experiment are outlined.

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