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Searching for New Physics at the LHC The Story You Haven't Heard

Department of Physics Colloquium



WISCONSIN

There are two ways to discover new particles: we can make them in the lab and observe their decays or we can observe discrepancies between precision measurements and theoretical predictions. Both methods are being employed by the LHCb experiment at CERN to search for what lies beyond the Standard Model (SM) of particle physics. The LHCb experiment has published over 170 papers since 2011. The core physics program involves making precise measurements of observables whose SM predictions are well known and that are expected to be extremely sensitive to a wide range of beyond the SM theories, e.g., supersymmetry. The magic of quantum mechanics permits particles that are too massive to be produced in the lab, even at the LHC, to make significant contributions to the observables measured at LHCb. If, in fact, the lightest new particles cannot be produced directly at the LHC, then our only hope for discovery at a collider in the coming decades is via such indirect observations. I will also discuss direct searches for light dark matter candidates and other future prospects for discovery.

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