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The Quest for Dark Matter

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We know Dark Matter exists. We have discovered it with independent measurements spanning time from a few minutes after the Big Bang all the way to today, and spanning vast length scales from the Cosmos as a whole to individual galaxies, including our own Milky Way. Yet, what Dark Matter is made of remains entirely unknown. Whereas the standard model of particle physics has been verified completely with the discovery of the Higgs boson, Dark Matter persists as an unresolved mystery. Thus, research into the nature of Dark Matter is of utmost importance to our view of the Cosmos. Given the ample parameter space that is available for models of Dark Matter, it is clear that a diverse and thorough experimental effort is required, supported by guidance from theory. This keynote will synthesize what we know about Dark Matter and what we don't know, and what we can learn with existing and upcoming experiments. These explore Dark Matter interactions with known particles, with itself, and at a range of different energies. Collider experiments are a proven path to the discovery of new particles, and with the LHC expected to turn back on next year, an unprecedented reach in both coupling strength and mass can be expected. Searches for the products of Dark Matter annihilation now have the sensitivity to very reasonably discover Dark Matter annihilation in various channels. Astrophysical observations start to explore relevant regions of parameter space for the interaction of Dark Matter with itself. And direct searches that probe the interaction of Dark Matter with laboratory targets are now covering most of the expected parameter space for promising Dark Matter candidate particles such as Axions and Weakly Interacting Massive Particles. Rapid progress is made on all fronts, and with unexplained signals observed in some of these experiments, the Quest for Dark Matter is in a most exciting and most promising phase.