

APR16-2016-000985

Abstract for an Invited Paper
for the APR16 Meeting of
the American Physical Society

Physics at Future Circular Colliders

ASHUTOSH KOTWAL, Fermilab and Duke University

The Large Hadron Collider has been a grand success with the discovery of the Higgs boson, with bright prospects for additional discoveries since the recent increase in collider energy and the anticipated large datasets. Big open questions such as the nature of dark matter, the origin of the matter-antimatter asymmetry in the Universe, and the theoretical puzzle of the finely-tuned parameters in the Higgs sector, demand new physics principles that extend the established Standard Model paradigm. Future circular colliders in a substantially larger tunnel can house both a high luminosity electron-positron collider for precision measurements of Higgs and electroweak parameters, as well as a very high energy proton-proton collider which can directly manifest particles associated with these new physics principles. We discuss the physics goals of these future circular colliders, and the prospects for elucidating fundamental new laws of nature that will significantly extend our understanding of the Universe. Detailed studies of the discovery potential in specific benchmark models will be presented, with implications for detector design.