1. Record Nr. UNINA9910863187203321

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Titolo	Searching for Squarks : in Compressed States and States with Jets from Charm Quarks with the Atlas Detector / / by Samuel Jones
Pubbl/distr/stampa	Springer International Publishing, 2020 Cham : , : Springer International Publishing : , : Imprint : Springer, , 2020
ISBN	3-030-54288-2
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (235 pages)
Collana	Springer Theses, Recognizing Outstanding Ph.D. Research, , 2190-5053
Disciplina	539.72167
Soggetti	Particles (Nuclear physics) Quantum field theory Physical measurements Measurement Elementary Particles, Quantum Field Theory Measurement Science and Instrumentation
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Introduction -- Theoretical Background -- The ATLAS Experiment -- Data Acquisition and Reconstruction -- Search for SUSY in Final States with Jets from Charm Quarks -- Soft b-tagging in Compressed SUSY Scenarios -- Conclusion -- Appendix.
Sommario/riassunto	This thesis focuses on searches for squarks with the ATLAS detector in "compressed" scenarios where the scalar top is very close in mass to the lightest supersymmetric particle. These models are theoretically appealing because the presence of a quasi-degenerate scalar top enhances the self-annihilation cross-section of the lightest supersymmetric particle, acting therefore as a regulator of the dark matter relic density. Two main analyses are presented: the first is a search for scalar tops decaying to charm quarks. The identification of jets originating from the charm quark is very challenging due to its short lifetime. The calibration of tools for charm-tagging has paved the way to measuring the decay of the Higgs boson to pairs of charm

quarks. The second analysis presented is the development of a novel technique for reconstructing low momentum b-hadrons. This tool has enabled the ATLAS collaboration to explore topologies that were previously inaccessible.