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Titolo	Particle Polarization in High Energy Physics : An Introduction and Case Studies on Vector Particle Production at the LHC
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Descrizione fisica	1 electronic resource (302 p.)
Collana	Lecture Notes in Physics
Altri autori (Persone)	LourençoCarlos
Soggetti	Quantum physics (quantum mechanics & quantum field theory) Mensuration & systems of measurement Particle & high-energy physics
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Sommario/riassunto	This open-access book addresses the following questions: how does the polarization of a particle, i.e., the angular momentum state in which it is produced, manifest itself in nature? What are the concepts and tools needed to perform rigorous measurements providing complete and unambiguous physical information? Polarization measurements are important because they reflect the nature and coupling properties of a particle and provide unique insights into the underlying fundamental interactions, playing a central role in the study and understanding of the mechanisms of particle production. Besides gradually reviewing many fundamental notions, the book presents several case studies relevant to physics analyses underway at the LHC, including the lepton-antilepton decays of vector states (Drell–Yan, Z and W bosons, quarkonia, etc.). The book also offers a detailed discussion of cascade decays, where the vector particle is a daughter of another particle, as well as a survey of typical angular distributions of particles of any integer or half-integer spin. With a visual approach to the presentation of the concepts and frequent use of pedagogical examples, taken from real measurements, gedankenexperiments, or detailed simulations, the book focuses on aspects of polarization measurements that are

sometimes underestimated or left unexplored in experimental analyses, such as the importance of the choice of the reference frame, the existence of frame-independent relations, and the shapes of the physically allowed parameter domains. Several examples are provided of pitfalls introduced when the intrinsic multidimensionality of the problem is neglected in exchange for a simplified analysis. Targeting an audience of graduate students, post-docs, and other researchers involved in analyses of LHC data, this book helps to establish a solid bridge between high precision data, existing or soon to be collected, and accurate measurements, including high-sensitivity tests of the Standard Model.