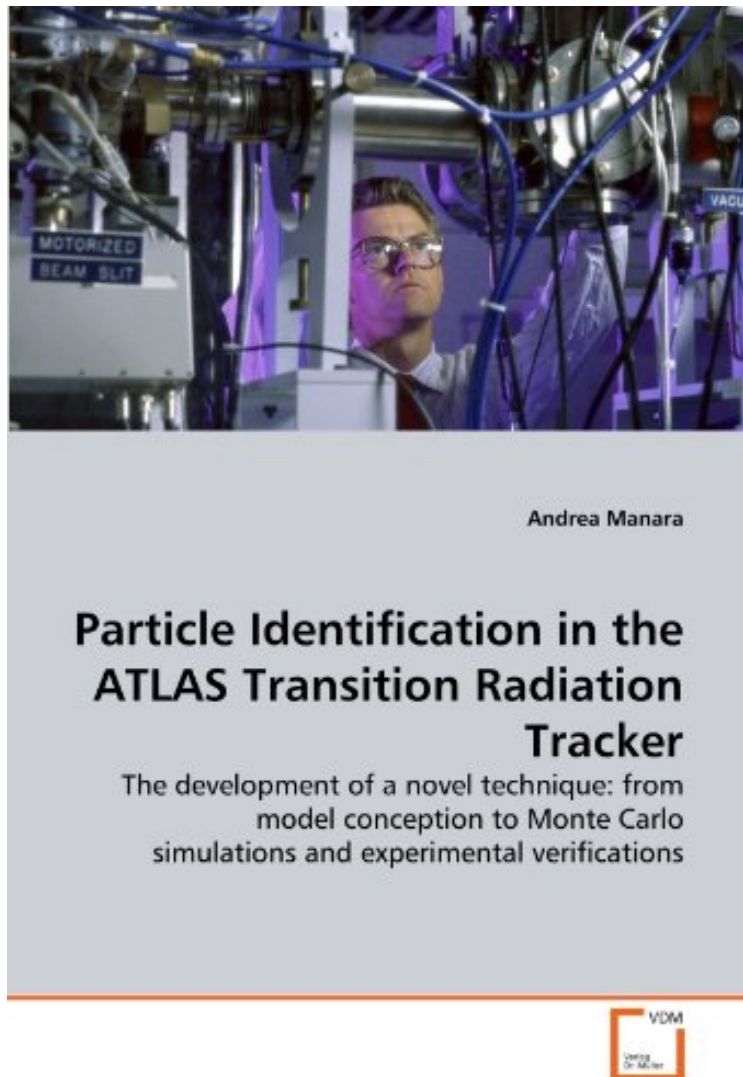


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Particle Identification in the ATLAS Transition Radiation Tracker: The development of a novel technique: from model conception to Monte Carlo simulations and experimental verifications

Andrea Manara

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simulations and experimental verifications:

The ATLAS experiment is currently investigating origin of mass, extra dimensions of space, unification of fundamental forces and evidence for dark matter candidates in the Universe. The Transition Radiation Tracker (TRT), in the ATLAS inner detector, is a straw drift-tube detector designed to be a powerful tracking device and to provide electron identification via transition-radiation detection. This book describes the development of a novel technique for particle identification: the Time-Over-Threshold which helps discriminating particles by measuring the width of the discriminated signal above a given threshold set in the front-end electronics. Today, ten years after this research, this technique is proving quite successful in ATLAS, which just started data taking at the Large Hadron Collider in CERN. This work should interest experimental physicists; the descriptive approach make it suitable also to a wider audience. The step-by-step approach, from model conception to Monte Carlo simulations and experimental verification, and the narrative style may appeal to young people in their approach to scientific experiments.

About the Author Ph.D. in high-energy physics, A. Manara participated in several experiments worldwide. He is currently working for the International Telecommunication Union, the leading UN agency for ICT issues, providing assistance to Member States in the application of the Radio Regulation and Regional Agreements related to terrestrial broadcasting services.