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INVESTIGATION OF Z^0 BOSON USING CERN LHCb OPEN DATA

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Starting from the mid-20th century, the CERN laboratory has evolved into the foremost hub for fundamental physics, aiming not only to conduct groundbreaking research but also to inspire, educate, and unite nations. The primary focus of CERN lies on experiments conducted with the Large Hadron Collider (LHC), the world's largest and most powerful particle accelerator. Key experiments such as ATLAS and CMS explore a broad spectrum of physical phenomena, including the elusive Higgs boson, through high-energy particle collisions. Beyond accelerators and laboratories, the CERN Open Data project, initiated in 2014, enables enthusiasts worldwide to engage in data analysis with specific datasets.

This presentation provides an exploration of the intricate process through which data from the LHCb experiment reaches the CERN Open Data portal. The emphasis is on elucidating how this data, particularly regarding the Z^0 boson's decay into a muon pair, becomes accessible to a global audience.

Muons are subatomic particles that belong to the lepton family, sharing similarities with electrons but possessing greater mass. Due to their increased mass, muons play a crucial role in probing high-energy phenomena and are particularly significant in experiments involving particle accelerators like the LHC. Exploring the decay of the Z^0 boson into a muon pair through a Drell-Yan process, our research provides valuable insights into the fundamental interactions and properties of these particles, contributing as one of the initial analyses of LHCb data posted on the Open Data portal.