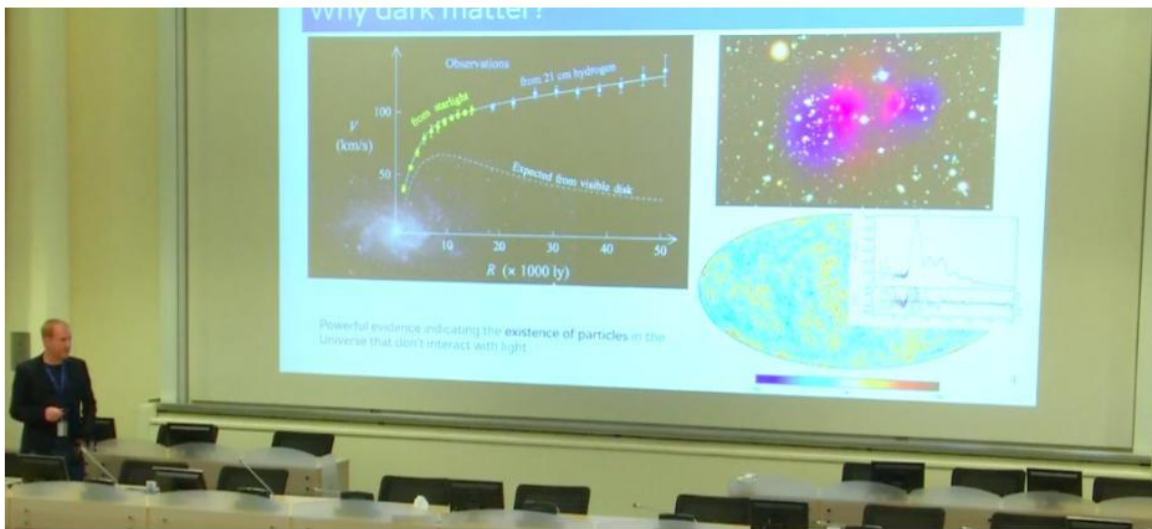


SONDERKOLLOQUIUM

AM 9. JULI 2024 UM 09:30 UHR
BIBLIOTHEK, WESTBAU PHYSIK



Unraveling the flavours and the darkness of the Universe

DR. ALVARO LOPEZ SOLIS
DESY, ZEUTHEN

The Standard Model of Particle Physics (SM) stands as one of the most profound achievements in modern physics, providing a comprehensive framework for understanding the fundamental building blocks of the universe and their interactions. Within this model, particles are classified into fermions and bosons, with fermions, such as quarks and leptons, constituting matter, while bosons mediate the fundamental forces. From the electromagnetic force governed by photons to the weak and strong nuclear forces mediated by W/Z bosons and gluons, respectively, the Standard Model elegantly encapsulates the dynamics of particle interactions. Yet, despite its remarkable success in describing a wide range of phenomena and its validation through numerous experimental observations, it is still not a complete theory as there are still several unresolved questions. Motivated by this, my research aims at answering the open questions related to the Higgs boson mass and the quest for dark matter. These are some of the most striking open questions of particle physics nowadays and a discovery in any of these topics would constitute a unique breakthrough in our knowledge of the Universe. My professional experience has allowed me to develop expertise in data analysis, classification algorithms based on multivariate techniques and machine learning and detection techniques, notably related to the field of high energy physics. My work has been rewarded with publications in several peer-reviewed journals and my results have been presented in different conferences. Furthermore, I have developed my scientific career in various laboratories based in different EU countries and work with teams from multiple nationalities, which allowed me to learn long-distance and multicultural team management techniques for efficient international collaborations. My future research project continues this scientific adventure by further exploring the nature of dark matter with a particular interest in its flavour composition.