

Tobias Neumann – HEP Seminar – February 12, 2024
William and Mary

Realizing the precision era of collider physics

The Standard Model withstands all tests at colliders. Yet, we know from other sources that the Standard Model is incomplete. We are therefore entering an era of collider precision physics. This means that precision measurements will be our future way of discovery and demand equally precise predictions for interpreting signal and background.

In this talk you will learn about the state-of-the-art of the highest-precision collider predictions and why and how they are structurally falling short to match even current demands. The challenge in matching the required precision at the level of 1\% is that predictions need a highly complex and technical combination of many ingredients from a wide landscape of perturbative and non-perturbative technology. Current theory frameworks are not able to deliver this precision. Instead, it will require a major break-through effort that I will lay out based on my research and a comprehensive future plan, leading to cross-disciplinary insight connecting particle and nuclear physics.