

DIS2023: XXX International Workshop on Deep-Inelastic Scattering and Related Subjects



Contribution ID: 270

Type: Parallel talk

Probing the Weak Mixing Angle at high energies at the LHC

Tuesday, 28 March 2023 15:00 (20 minutes)

The weak mixing angle is a probe of the vector-axial coupling structure of electroweak interactions. It has been measured precisely at the Z -pole by experiments at the LEP and SLD colliders, but its energy dependence above Z remains unconstrained.

In this contribution we propose to exploit measurements of Neutral-Current Drell-Yan at large invariant dilepton masses at the Large Hadron Collider to determine the scale dependence of the weak mixing angle in the \overline{MS} renormalisation scheme, $\sin^2 \theta_W(\mu)$.

Such a measurement can be used to test the Standard Model predictions for the \overline{MS} running at TeV scales, and to set model-independent constraints on new states with electroweak quantum numbers.

To this end, we present an implementation of $\sin^2 \theta_W(\mu)$ in the Powheg-Box Monte Carlo event generator, which we use to explore the potential of future analyses with the LHC Run3 and High-Luminosity datasets. In particular, the impact of higher order electroweak corrections and of the uncertainties due the knowledge of parton distribution functions are studied.

Submitted on behalf of a Collaboration?

No

Participate in poster competition?

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Session Classification: WG3

Track Classification: WG3: Electroweak Physics and Beyond the Standard Model