## XXVI DAE-BRNS High Energy Physics Symposium 2024



Contribution ID: 236

Type: Oral

## A novel jet substructure approach to polarization measurement in boosted hadronic W bosons

In this work, we introduce a novel technique for measuring the longitudinal and transverse polarization fractions of boosted hadronic W boson decays. We propose a jet substructure observable,  $p_{\theta}$ , derived from subjet energies, serving as a proxy for the

W boson's parton-level decay polar angle in its rest-frame. This observable is sensitive to W boson polarization and offers lower reconstruction errors than existing proxies, especially for highly boosted W bosons. Looking forward to an optimistic scenario with  $10 \text{ ab}^{-1}$  of data at the High Luminosity LHC, our technique could achieve a 20% error in measuring the transverse W polarization fraction. Although detecting longitudinal polarization consistent with the Standard Model at the  $2\sigma$  level may remain challenging, this method holds potential for identifying enhancements in Beyond Standard Model scenarios, thereby contributing to unitarity restoration studies.

## **Field of contribution**

Phenomenology

**Authors:** Dr DE, Songshaptak (Institute of Physics Bhubaneswar); Prof. RENTALA, Vikram (IIT Bombay); Prof. SHEPHERD, William (Sam Houston State University)

Presenter: Dr DE, Songshaptak (Institute of Physics Bhubaneswar)

Track Classification: Top Quark and EW physics