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Conserved Currents and the Power of Enhancement: Unveiling New Bounds

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In the ever-expanding landscape of BSM model building, the ubiquitous presence of new vector bosons has led to new frontiers in probing the depths of fundamental physics. While it is widely acknowledged that non-conserved currents of these vector bosons can lead to (energy/vector mass)^2 enhancements, we diverge from standard literature and consider the realm of conserved currents. We demonstrate that conserved currents can lead to similar enhancements, provided we focus on specific energy regimes. In this talk, we focus on two common scenarios: rare Z decays and meson decays which lead to flavor changing neutral currents. By analyzing these processes, we not only shed light on the underlying mechanisms but also establish constraints on their existence using data from a range of experiments. These experimental bounds play a pivotal role in elucidating the potential implications of these enhanced processes within the broader context of particle physics.

Author: SMITH, Tyler (University of California, Irvine)

Presenter: SMITH, Tyler (University of California, Irvine)

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