

# Phenomenology 2021 Symposium



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## Bounds on Gauge Bosons Coupled to Non-conserved Currents

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We discuss new bounds on vectors coupled to currents whose non-conservation is due to mass terms, such as  $U(1)_{L_\mu-L_\tau}$ . In scenarios with Stueckelberg masses for such gauge bosons, due to the emission of many final state longitudinally polarized gauge bosons, inclusive rates grow exponentially fast in energy, leading to strong constraints. We present bounds coming from the high invariant mass tail of di-lepton events at the LHC, which beat out cosmological bounds to place the strongest limit on Stueckelberg  $U(1)_{L_\mu-L_\tau}$  models for most masses below a keV. We also discuss a stronger, but much more uncertain, bound coming from the validity of perturbation theory at the LHC.

### Summary

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