## Dark Vector Splitting Functions in Proton Bremsstrahlung

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High luminosity colliders and fixed target facilities using proton beams are sensitive to new weakly coupled degrees of freedom across a broad mass range. Among the various production modes in proton-proton collisions, bremsstrahlung is particularly important for dark sector degrees of freedom with masses between 0.5 and 2.0 GeV, due to mixing with hadronic resonances. In this talk, I will revisit the calculation of dark vector production via initial state radiation in non-single diffractive scattering, using an improved treatment of the splitting functions and timeline electromagnetic form factors at the proton vertex, including the dipole coupling. Resonant enhancements impact the sensitivity above the  $\rho/\omega$  mass range. The approach is benchmarked by applying an analogous calculation to model inclusive  $\rho$ -meson production. (based on 2409.09123)

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