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Lighting up Collider Searches for Electroweak States (15' + 5')

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Despite appearing in many extensions of the Standard Model, uncolored electroweak particles face limited collider search prospects. For nearly degenerate electroweak multiplets where the lightest state is electrically neutral, searches typically rely on pair production of the new states in association with visible radiation, e.g. the mono-X final state. We show that for such new particles, considering final-state photon radiation can provide increased sensitivity. As an example, we demonstrate that a photon + jet search would extend the ability of the LHC to probe degenerate Higgsinos beyond the reach achievable by a monojet analysis. We find that the additional kinematical information provided by considering an extra photon from final state radiation more than compensates for the reduced statistics, when including the effects of systematic uncertainties.

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