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## Probing for GeV-TeV Particles in the $U(1)_{T3R}$ BSM Extension from $g-g$ Fusion Processes at the LHC

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The  $U(1)_{T3R}$  extension of the Standard Model is an attractive formulation that addresses the mass hierarchy between the third and the first two generations of fermions, explains thermal dark matter abundance, and the muon  $g-2$  and  $R_{K^{(*)}}$  anomalies. The model contains a dark matter candidate, the  $\phi$  particle, and a vector-like quark scalar and vector mediator, the  $\chi_u$  particle. We perform a phenomenological study to search for and constrain the parameter space of the  $\chi_u$  and  $\phi$  particles using gluon-gluon fusion processes at the LHC. In particular, we consider decay modes with  $\mu^+\mu^-$  final states and use machine learning to maximize the signal sensitivity. We aim for a  $5\sigma$  discovery reach with an integrated luminosity of  $3000 \text{ fb}^{-1}$ .

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