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Multi Vector Boson Production via Gluon Fusion at Hadron Colliders

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At the LHC, the processes with several particles in the final

states occur routinely. These processes provide a new domain to test the standard model. Some of these processes can be

discovery/confirmation channel for beyond the standard model

scenarios also. Therefore, it is important to compute the contribution of the standard model to such multiparticle events. Furthermore, due to large gluon luminosity at the LHC, the gluon initiated processes can be quit important. We consider the production of multi vector bosons via gluon fusion. In particular we consider the processes

g g -> \gamma Z g and g g -> \gamma \gamma Z. These processes get contribution from the pentagon type diagrams also. We calculate these pentagon type (and box type) diagram contributions to the cross-section and distributions of these processes at hadron colliders. To do this calculation, we use Oldenborgh-Vermaseren techniques to reduce tensor-loop integrals to the scalar-loop integrals. We apply numerous checks to our calculations including cancellation of ultaviolate and infrared singularities as well as gauge invariance. Final numerical computation requires

the use of PVM to do parallel calculation on a cluster of computers. Our results for the cross-sections suggest that

these processes can be observed after a few years of the running of LHC.

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