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Pile-up background estimation in diboson production by the overlay Monte-Carlo method in pp collider experiment

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In case of diboson production in pp collisions there is a non-negligible possibility that some events passing the final selection in data are actually from multiple overlapping hard-scatter processes occurring within the same bunch-crossing. Such events with combination of two processes associated with different primary vertices corresponds to so-called pile-up background. Its contribution should be considered in analysis of diboson production. This study presents the overlay Monte-Carlo method for the estimation of pile-up background. The proposed approach uses two separate samples to construct pile-up events at particle-level. Then the detector efficiency is used to obtain the predicted number of such background events in the region of interest. According to the resulting estimate the impact of the pile-up background can be either subtracted from the number of signal events or accounted as an additional systematic uncertainty.

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