

## Impact of transverse coupling on the ATLAS luminosity calibration in the gaussian-beam limit

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The calibration of the absolute luminosity scale at ATLAS is performed by dedicated van der Meer (vdM) scans. The current process assumes the factorisation of the luminosity distribution in the horizontal and vertical directions (x and y, respectively). I study a model in which the individual beam densities are parameterised as single-Gaussians. The model includes the possibility of having a non-zero x-y correlation within each beam, as well as non-zero beam crossing angles. The model parameters are systematically constrained by comparing with a set of equations, for which it has been possible to derive fully-analytically, the various movements of the luminous region. The implication of non-zero x-y beam correlation on the measured luminosity has been considered for numerous vdM scans performed at ATLAS over the last three years.

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