Chapter 19

Results from gR coefficient

The benefit of looking also at the g_R coefficient, and not only focussing on the V_R one is that the relative changes in kinematics for this right-handed tensor coupling is expected to be much larger. This is explained by the way the coefficient enters the width formulas and the mixing which occurs with the V_R coefficient.
This different sensitivity is clearly visible in Figure 19.1. An additional bonus for the g_R coefficient is that the distributions are not symmetrical compared to 0.0 allowing the use of a simple second-order polynomial instead of a more complex 4^{th} order one which is needed for the V_R case.

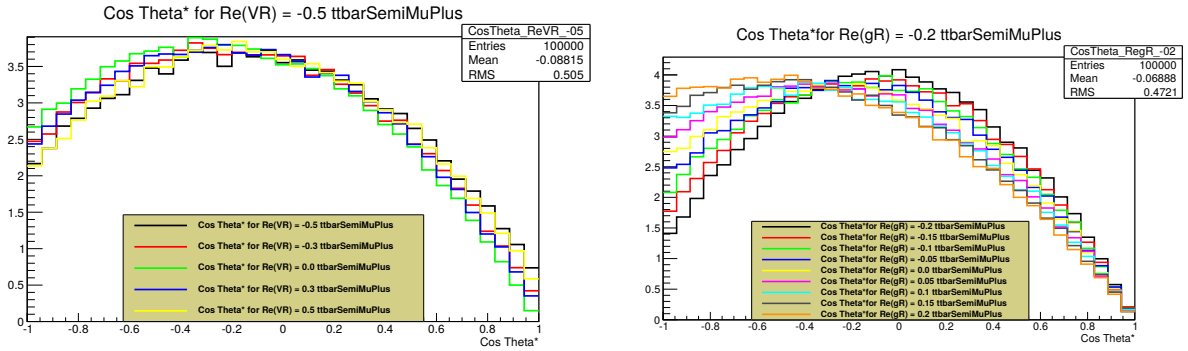

Figure 19.1: Stronger dependence of the $\cos\theta^*$ distribution on the g_R coefficient than on the V_R one. Therefore the g_R coefficient will be measured in a more narrow range than the one used for the V_R measurement.

The first results for this g_R coefficient are given in Figure 19.2 which shows the obtained likelihood distribution for most of the g_R values in the studied range:

$$g_R \in [-0.2, -0.15, -0.1, -0.05, 0.0, 0.05, 0.1, 0.15, 0.2] \tag{19.1}$$

Currently the result for $g_R = 0.1$ is still missing together with the values at the outer edges of the considered range. These last two are missing since the results for $g_R \pm 0.15$ seem to suggest that values further away from the expected Standard Model configuration value do not agree anymore with the simulated value. For all the smaller g_R values a nice agreement is found with the value used for generating the MadGraph sample.

From these $\ln(\mathcal{L})$ distributions can be concluded that the correct g_R coefficient is recoverd for most of the considered MadGraph samples. However the deviation from the

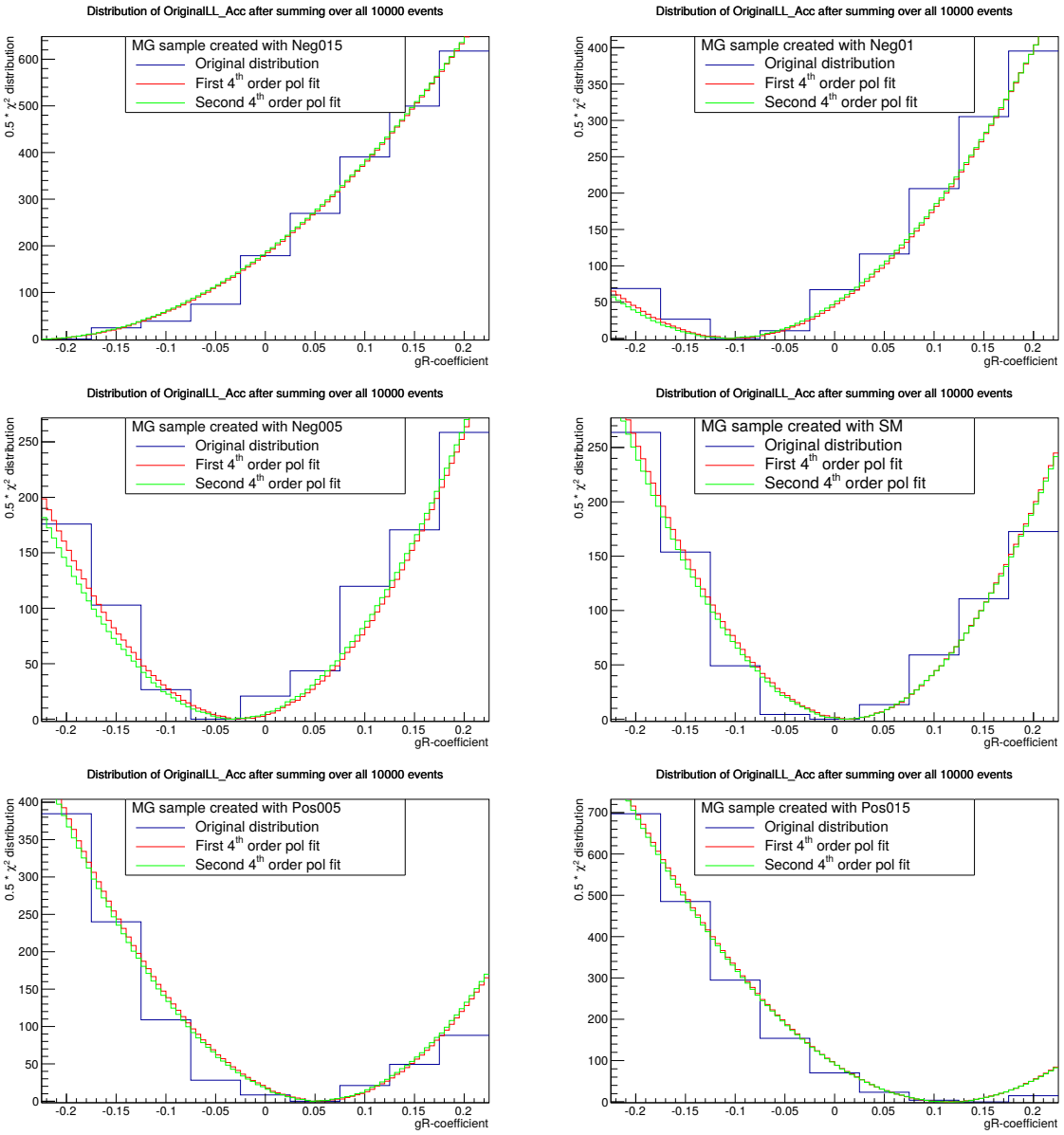

Figure 19.2: Obtained $\ln(\mathcal{L})$ distribution for MadGraph samples created with different g_R values. From top left to bottom right the values used are -0.15, -0.01, -0.05, 0.0, 0.05 and 0.15 respectively.

outer edges of the range are clearly visible and should be investigated further by looking at the result for a MadGraph sample created with $g_R = 0.1$.
Also the presence of large deviations in the kinematics, even for low changes in g_R, opens the possibility to add the $g_R = 0.025$ parameter to improve the accuracy close to the Standard Model expectation value.