Luminosity Spectrum Reconstruction - Impact of Detector Resolution Mismodelling

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Analysis Steps

What if we don't know the exact resolution of our detector?

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Monte Carlo generator: 10M e^+e^- pairs

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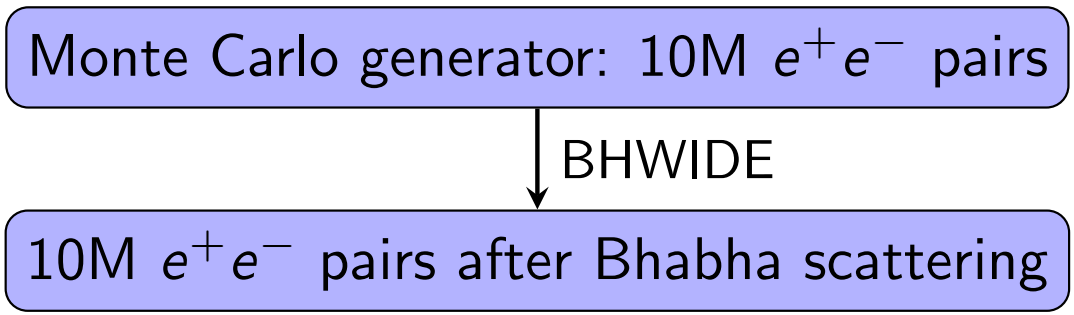

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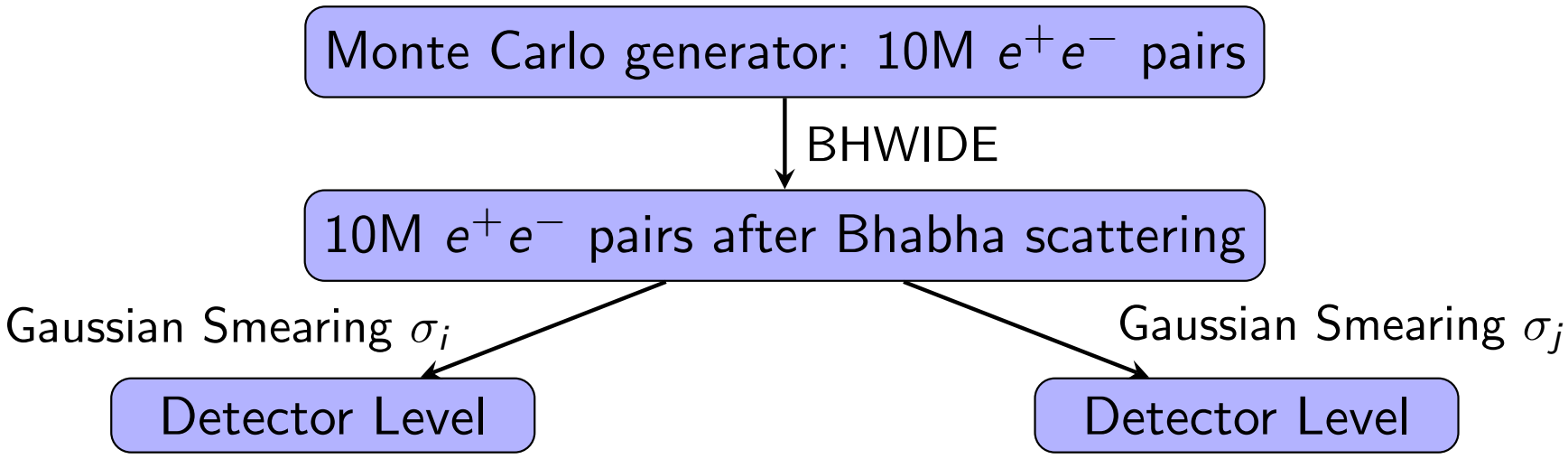

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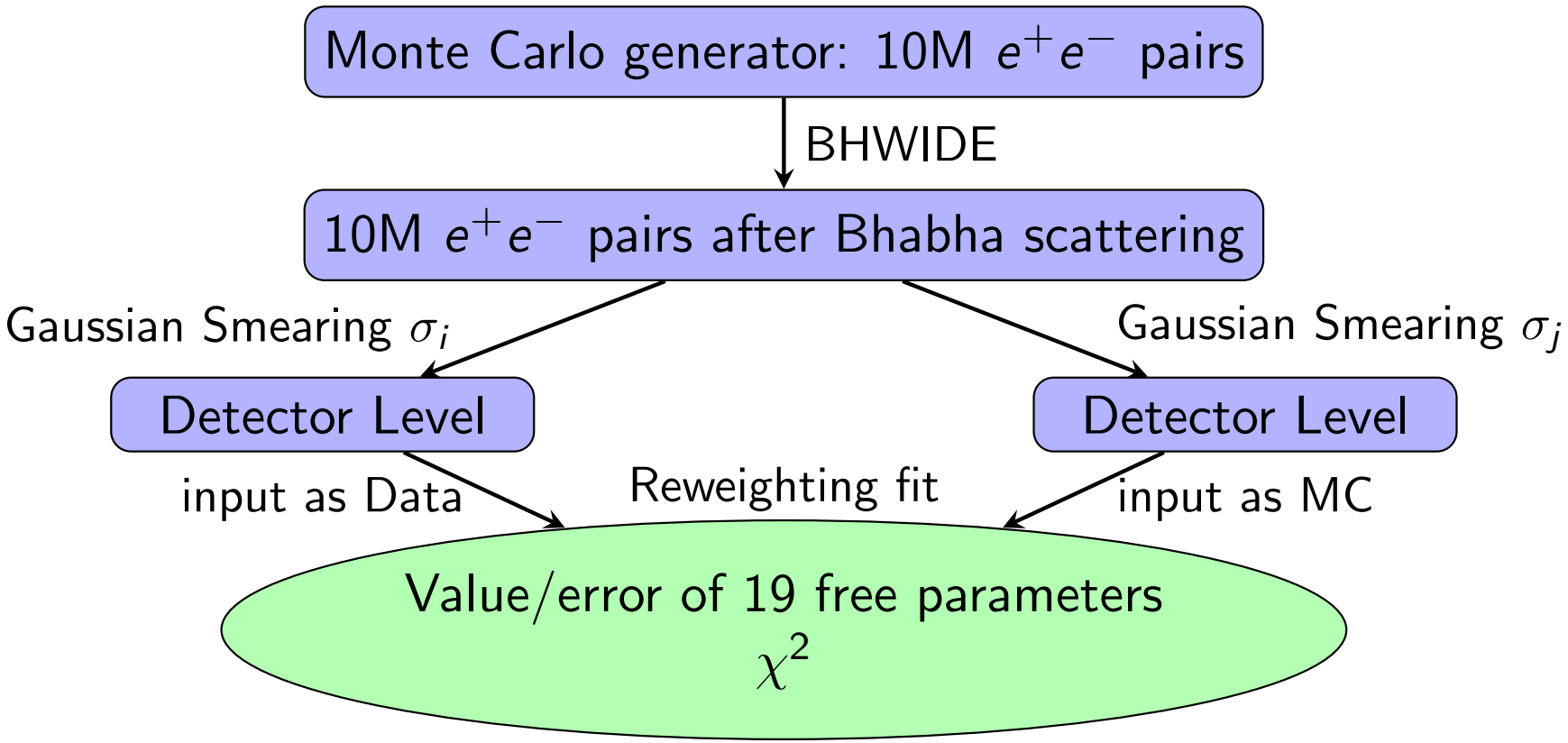
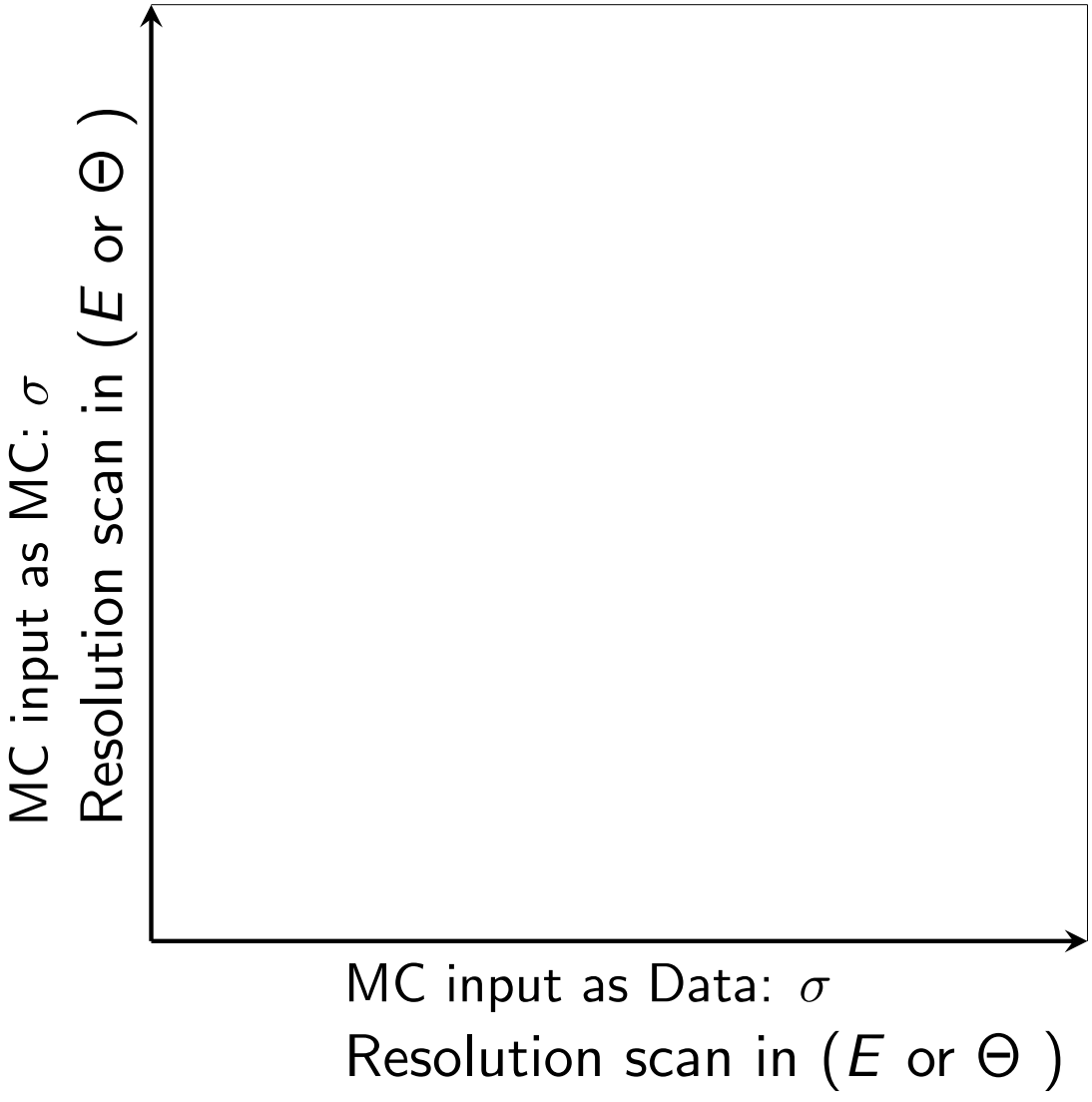


Plot Structure



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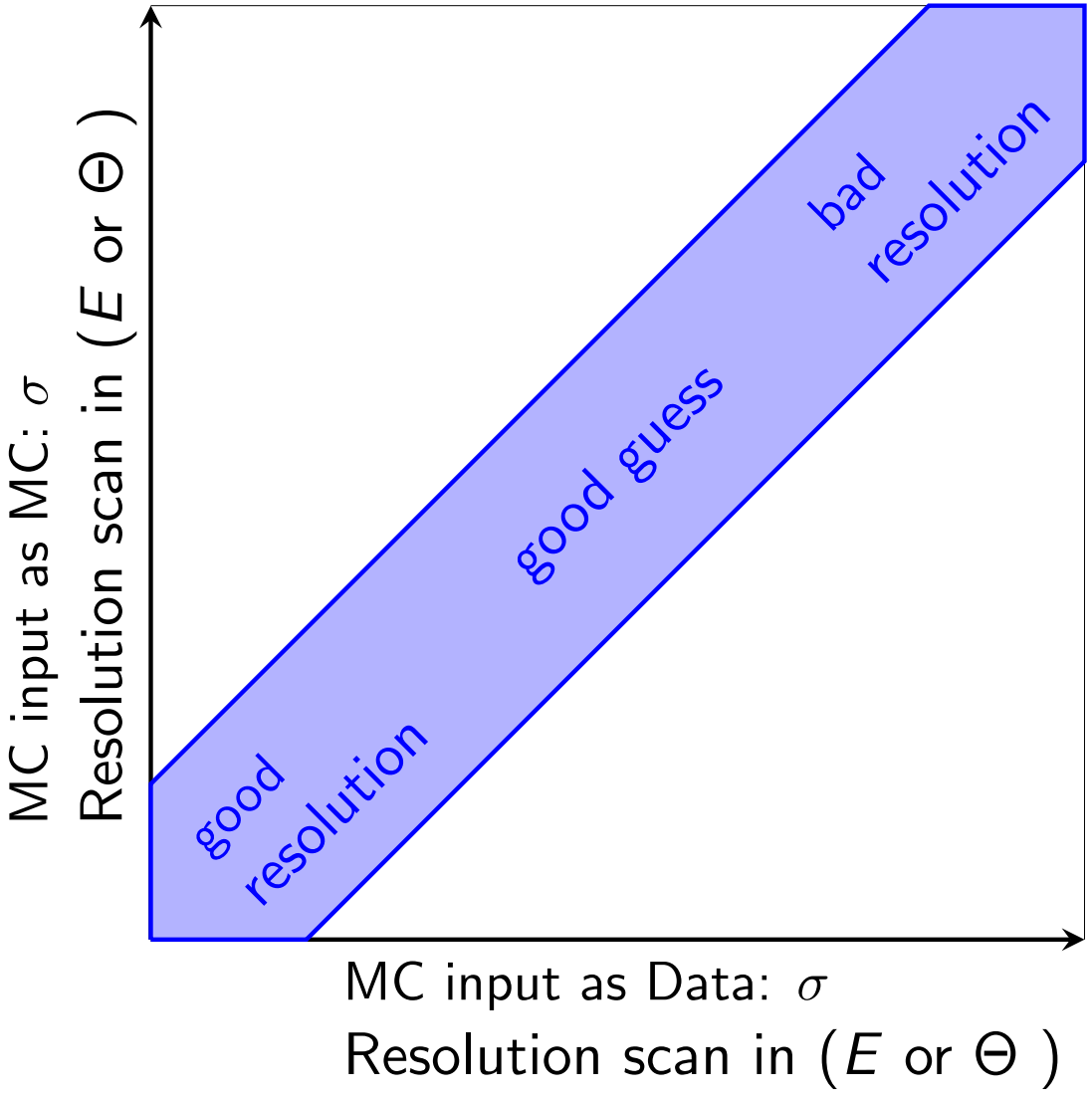

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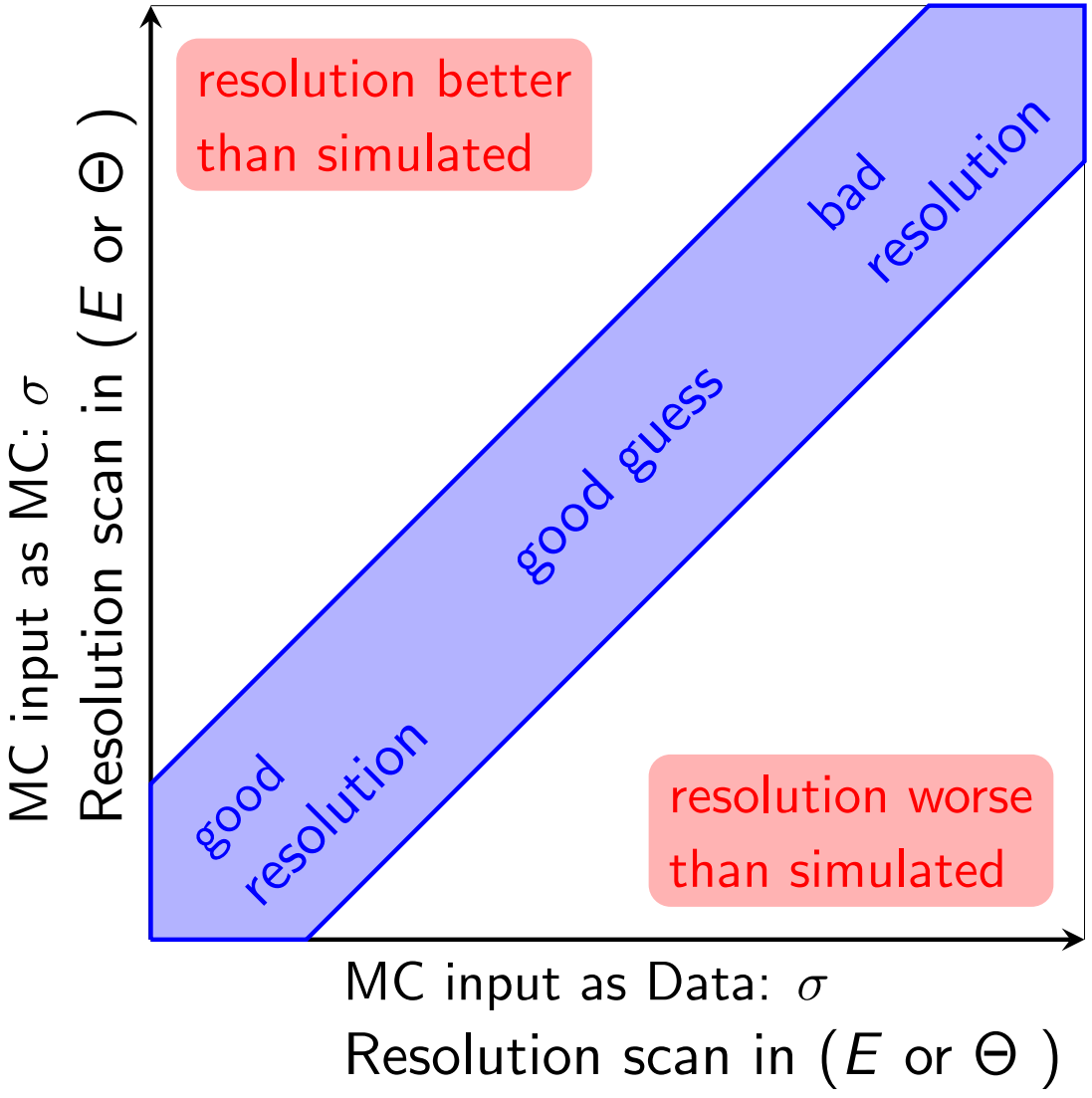
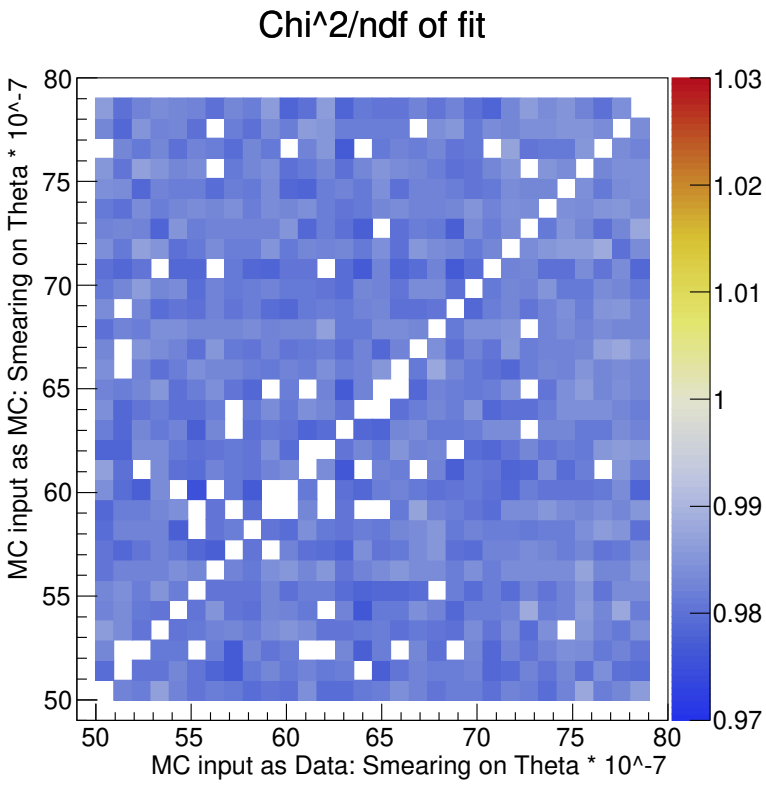


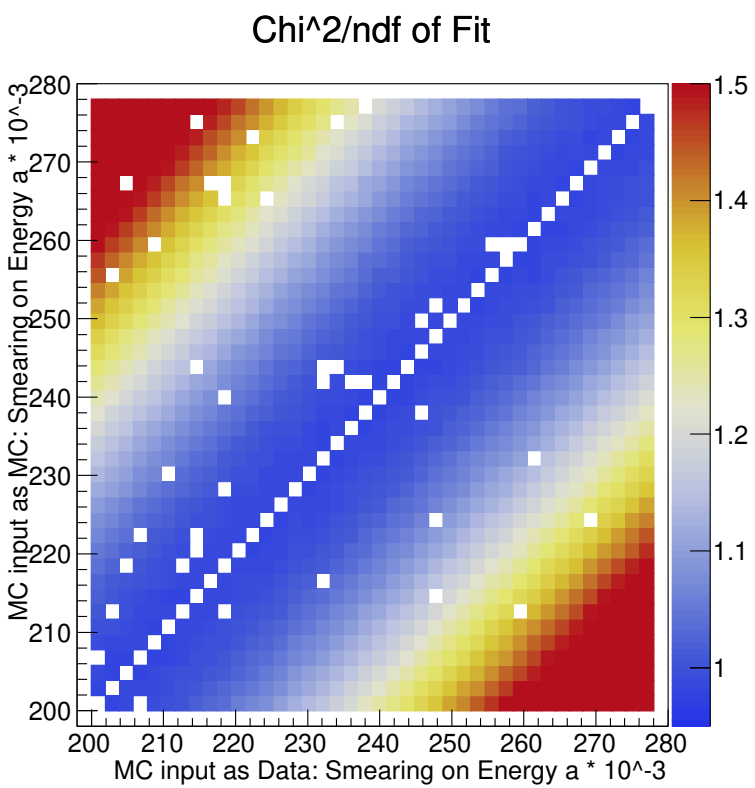
χ^2 results for Θ and Energy resolution scan

Θ



$31 \times 31 = 961$ data points

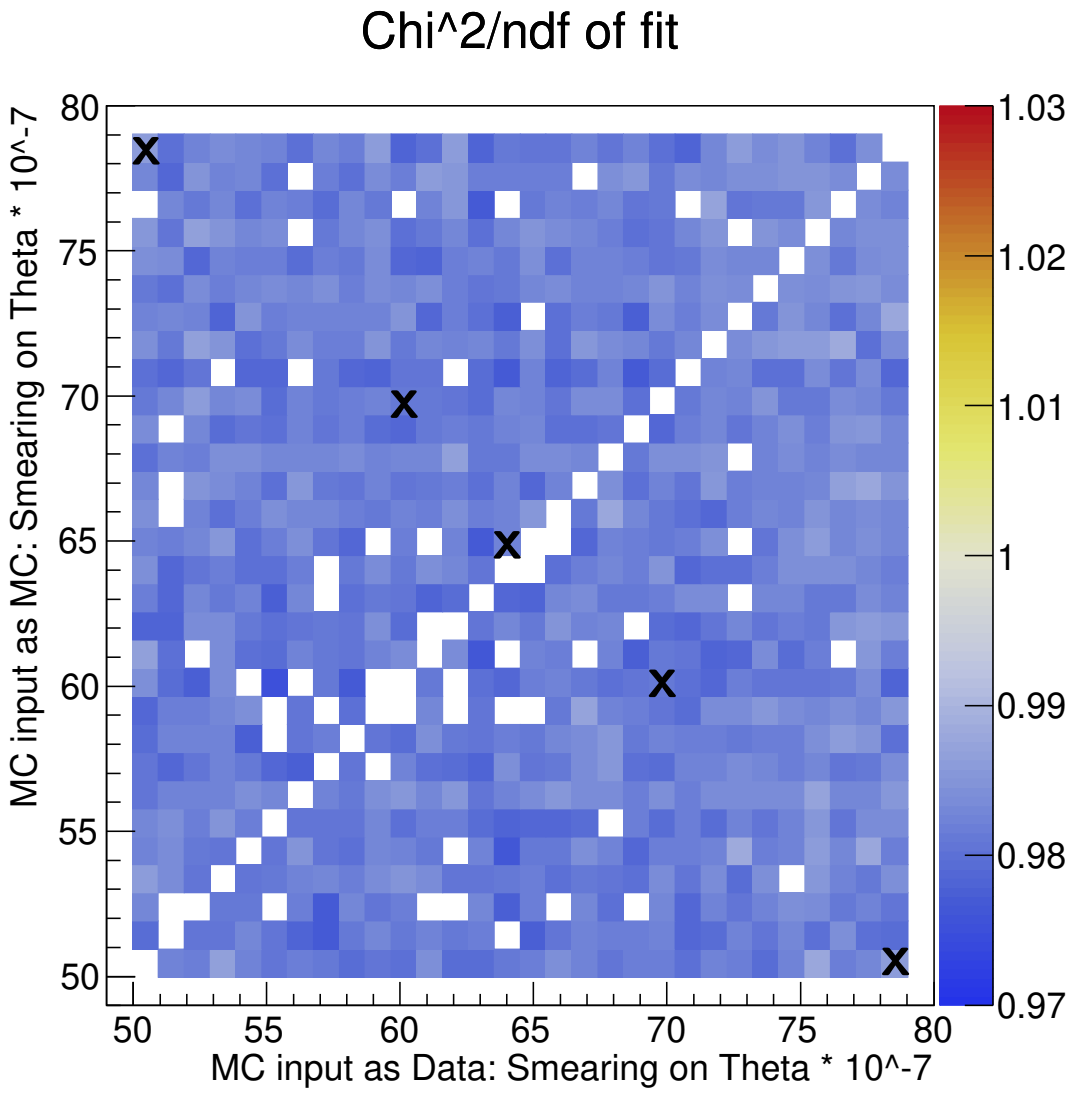
Energy



$41 \times 41 = 1681$ data points

$$\sigma_E = \frac{a}{\sqrt{E}} \oplus b$$

Impacts on top mass measurements: Theta



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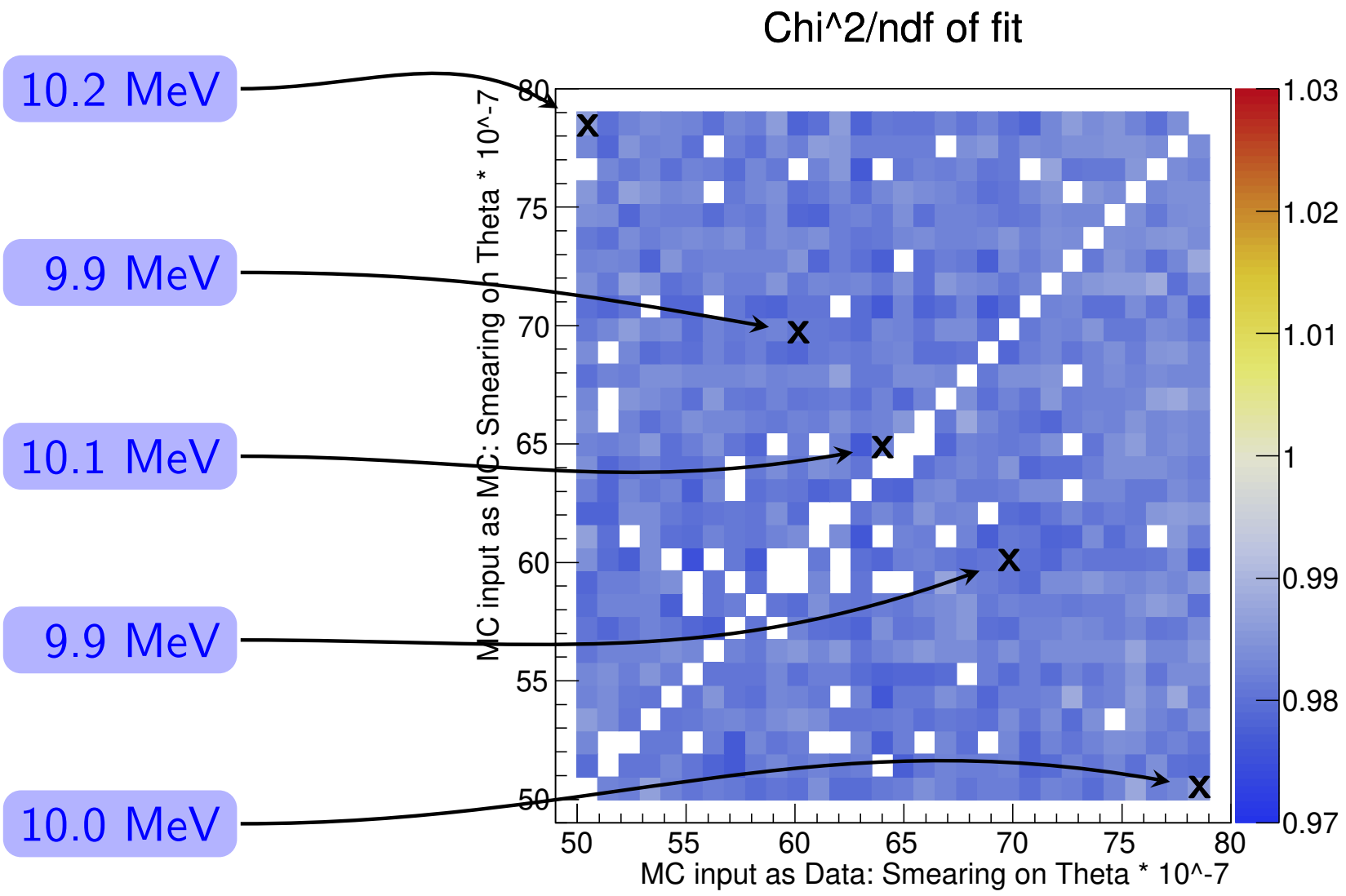
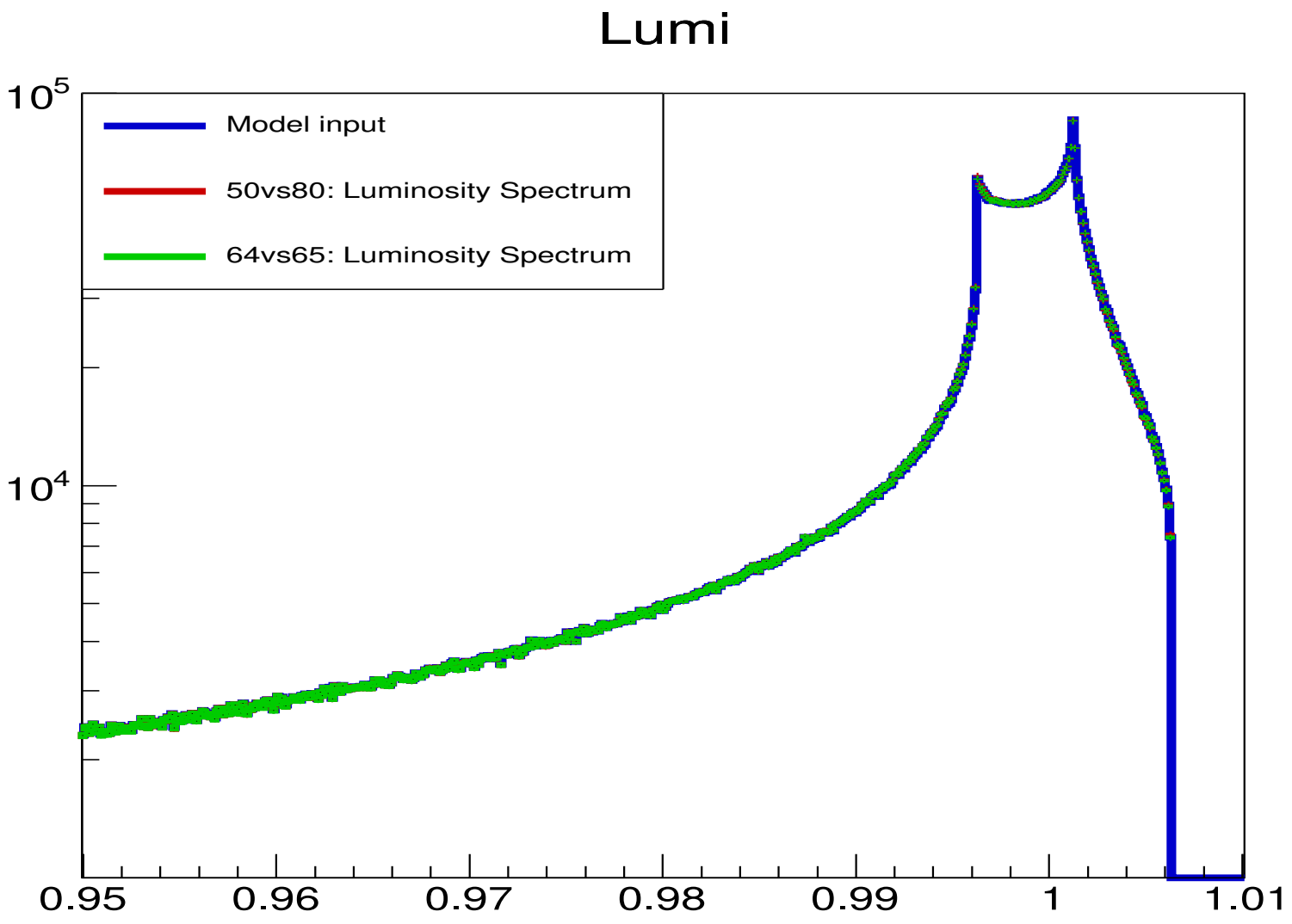
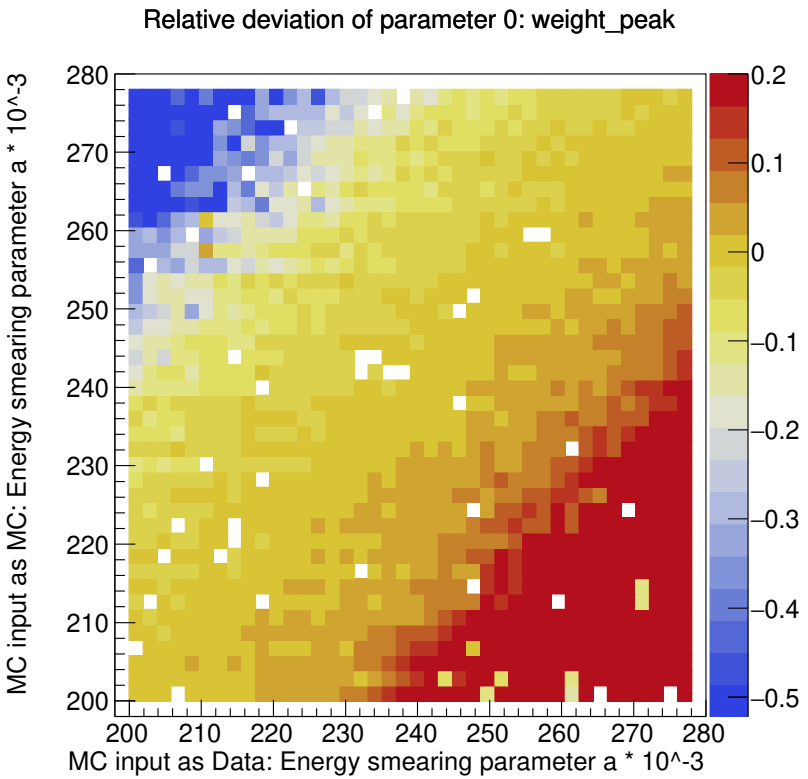
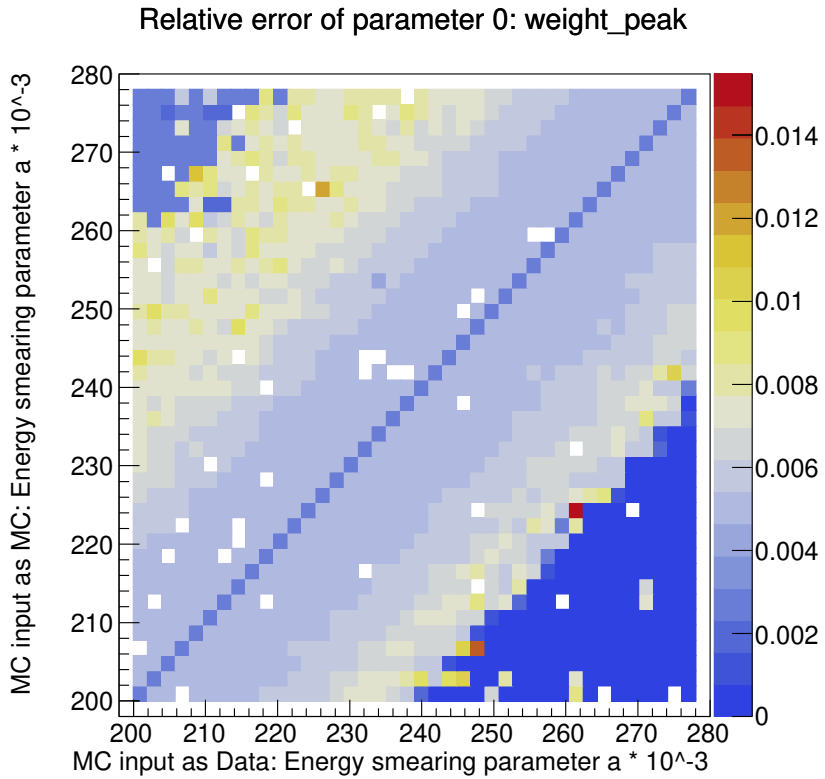


Luminosity Spectrum for mismodelling Θ



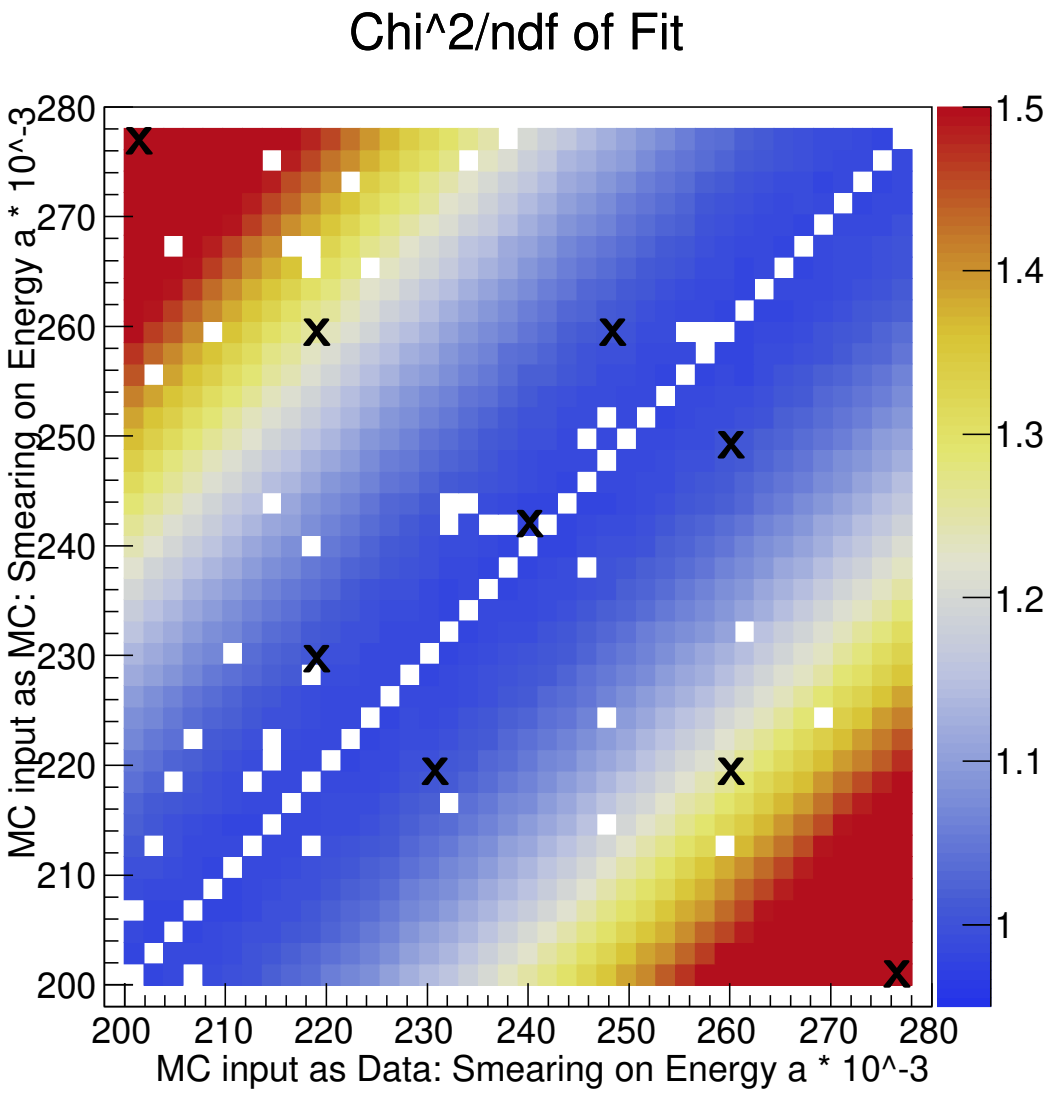
Problematic Missmodelling: Energy resolution



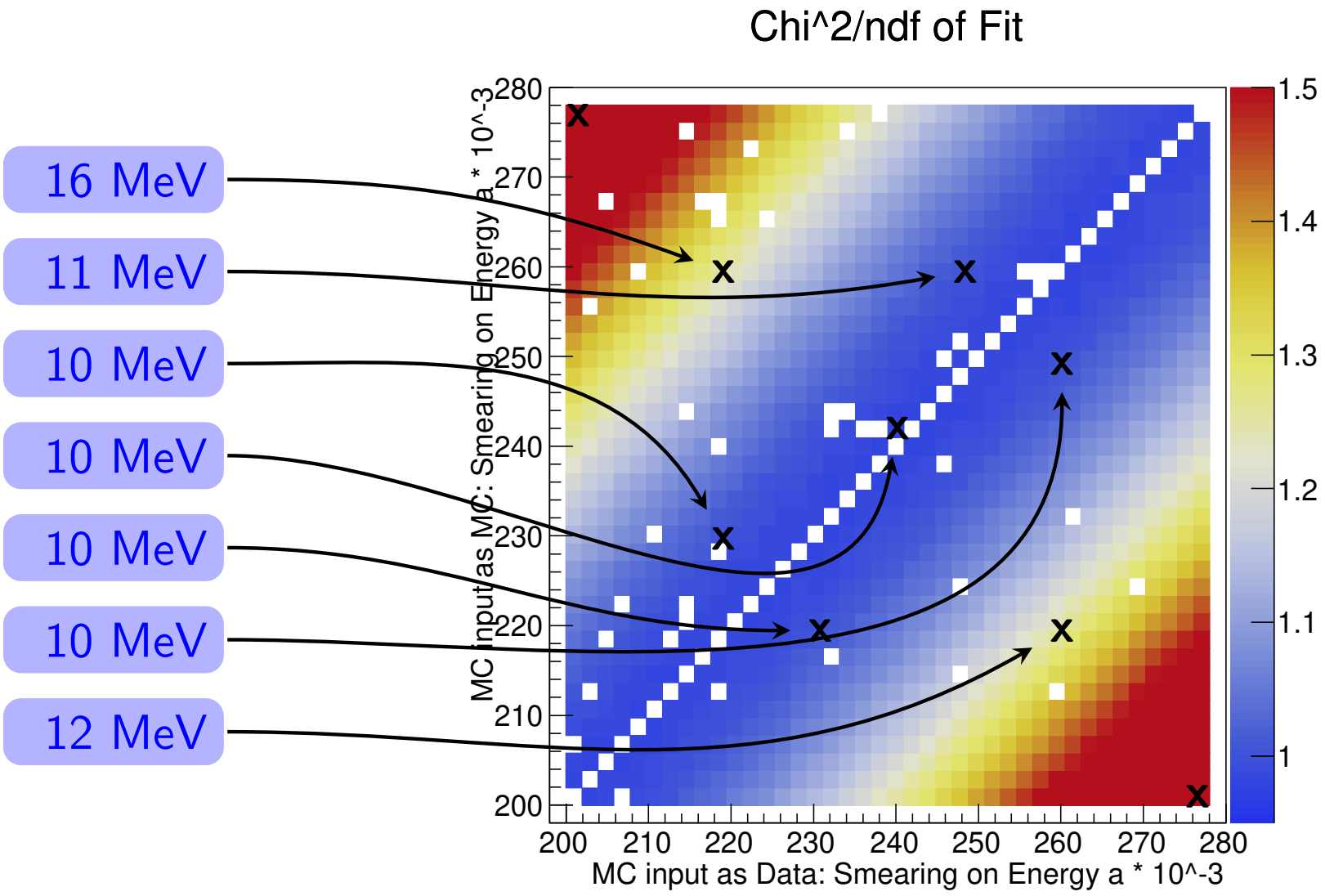


1. 'Stable zone' around diagonal: small error and little deviation
2. off-diagonal corners: large deviation, errors drop to zero

Impacts on top mass measurements: Energy



Impacts on top mass measurements: Energy



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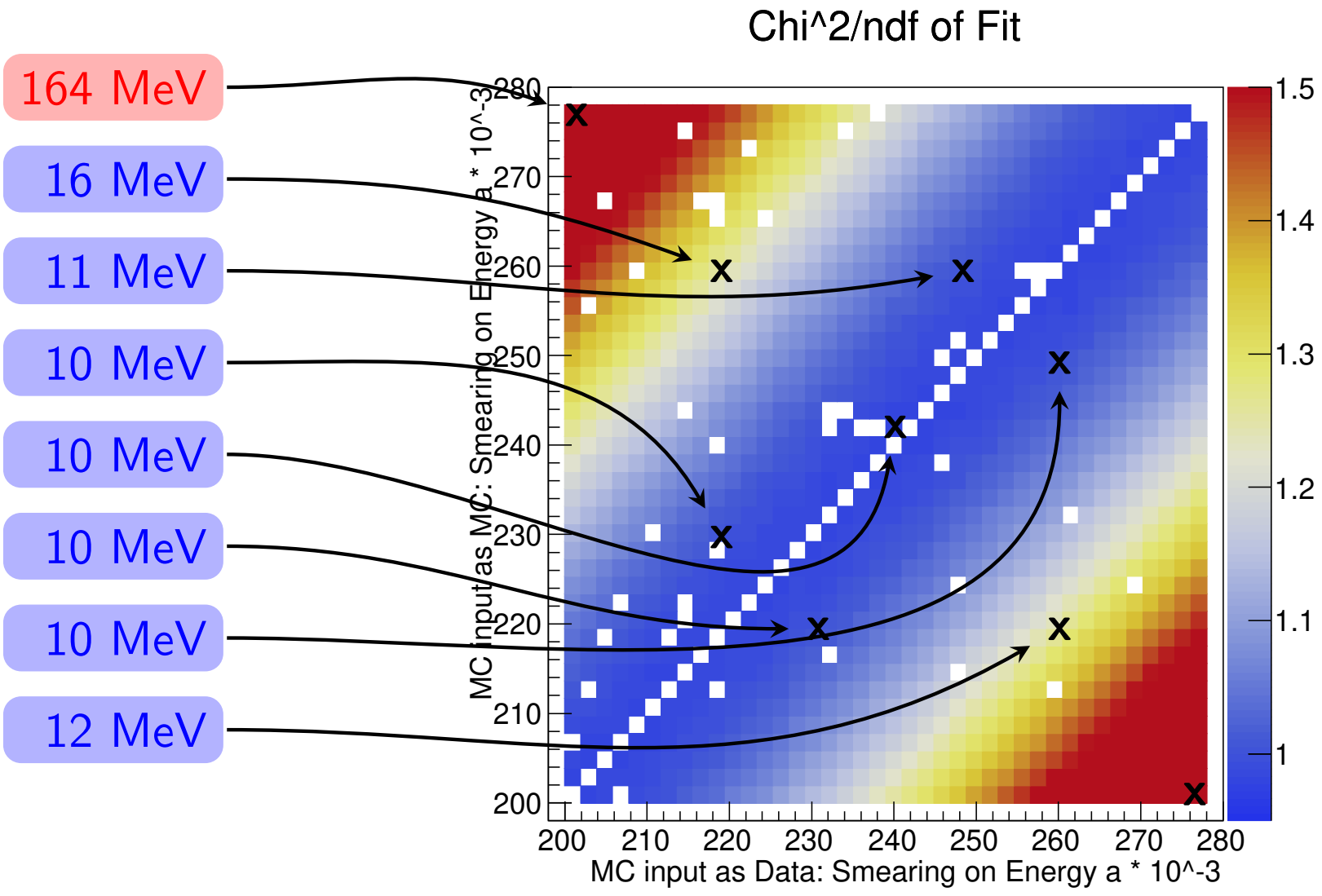

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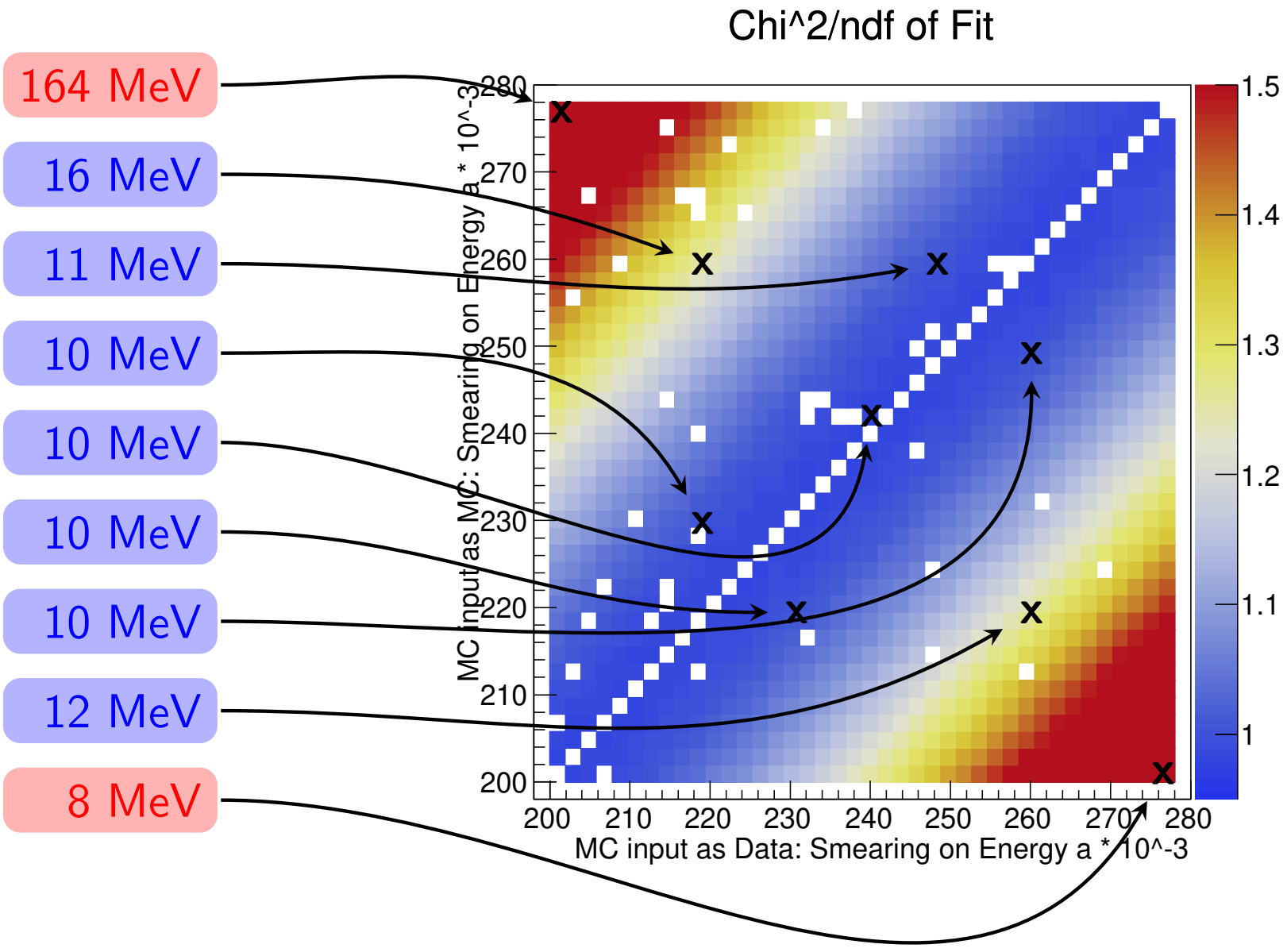
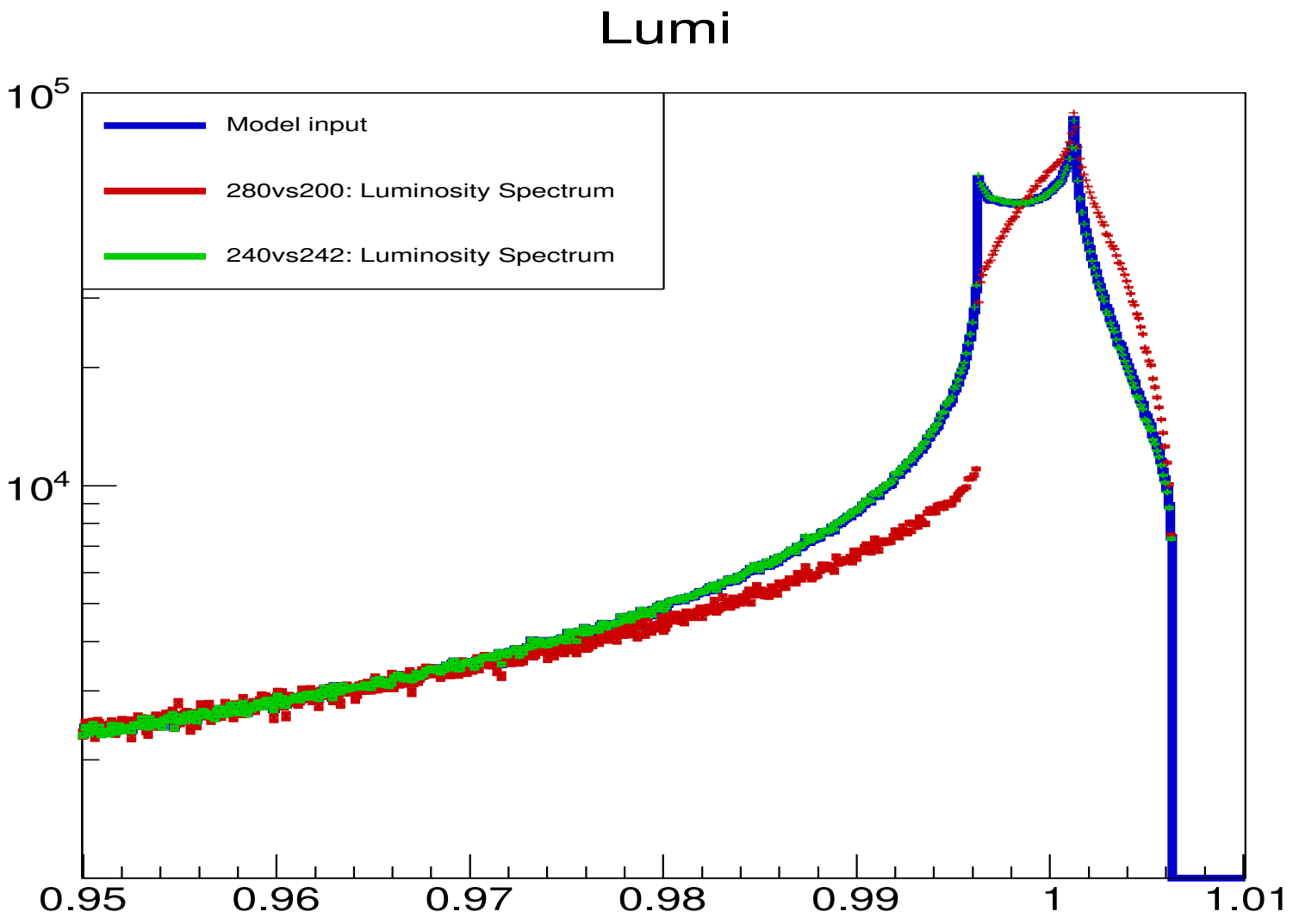


How reliable are the 8 MeV?



Conclusions

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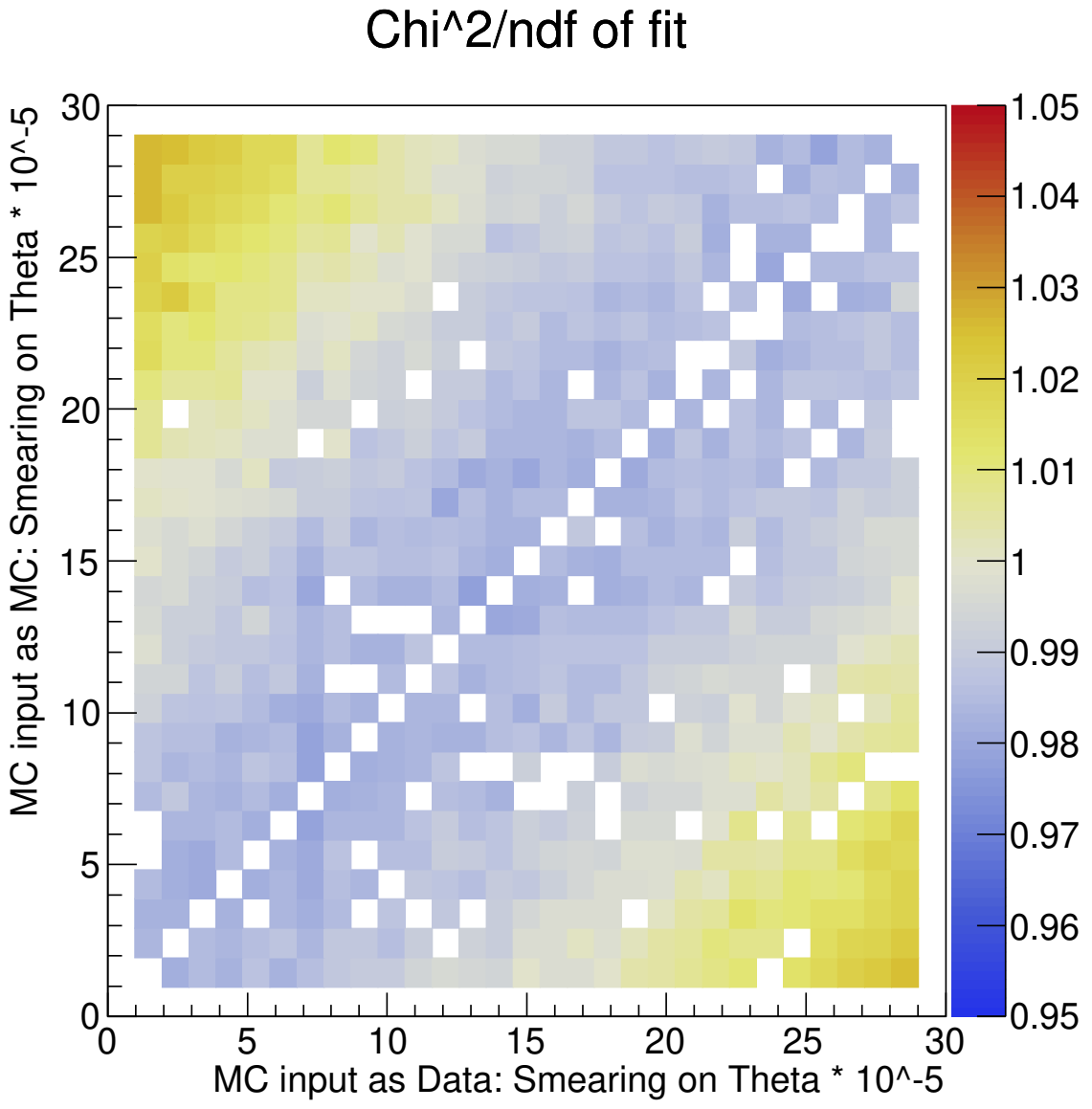
2. The energy resolution is more sensitive.
3. Errors stay relatively small, when mismodelling the resolution by $\pm 15\%$
4. Larger deviations either drastically increase the error, or yield unreliable results on error propagation

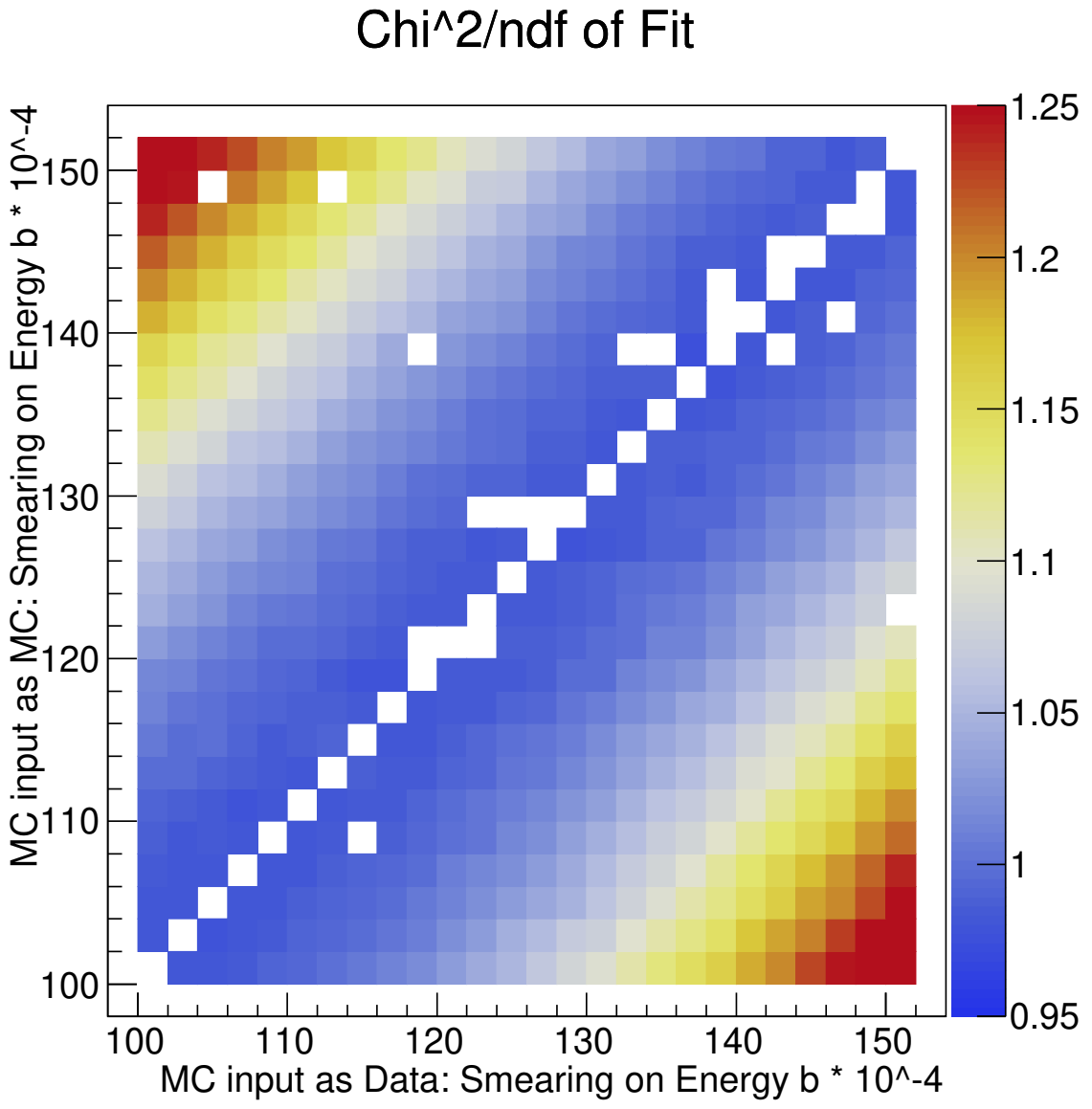
Reference

1. Luminosity Spectrum Reconstruction at Linear Colliders
   Authors: Stéphane Poss, André Sailer
   https://arxiv.org/abs/1309.0372
2. Errors on top quark mass provided by Pablo Gomis
   Link to his Presentation

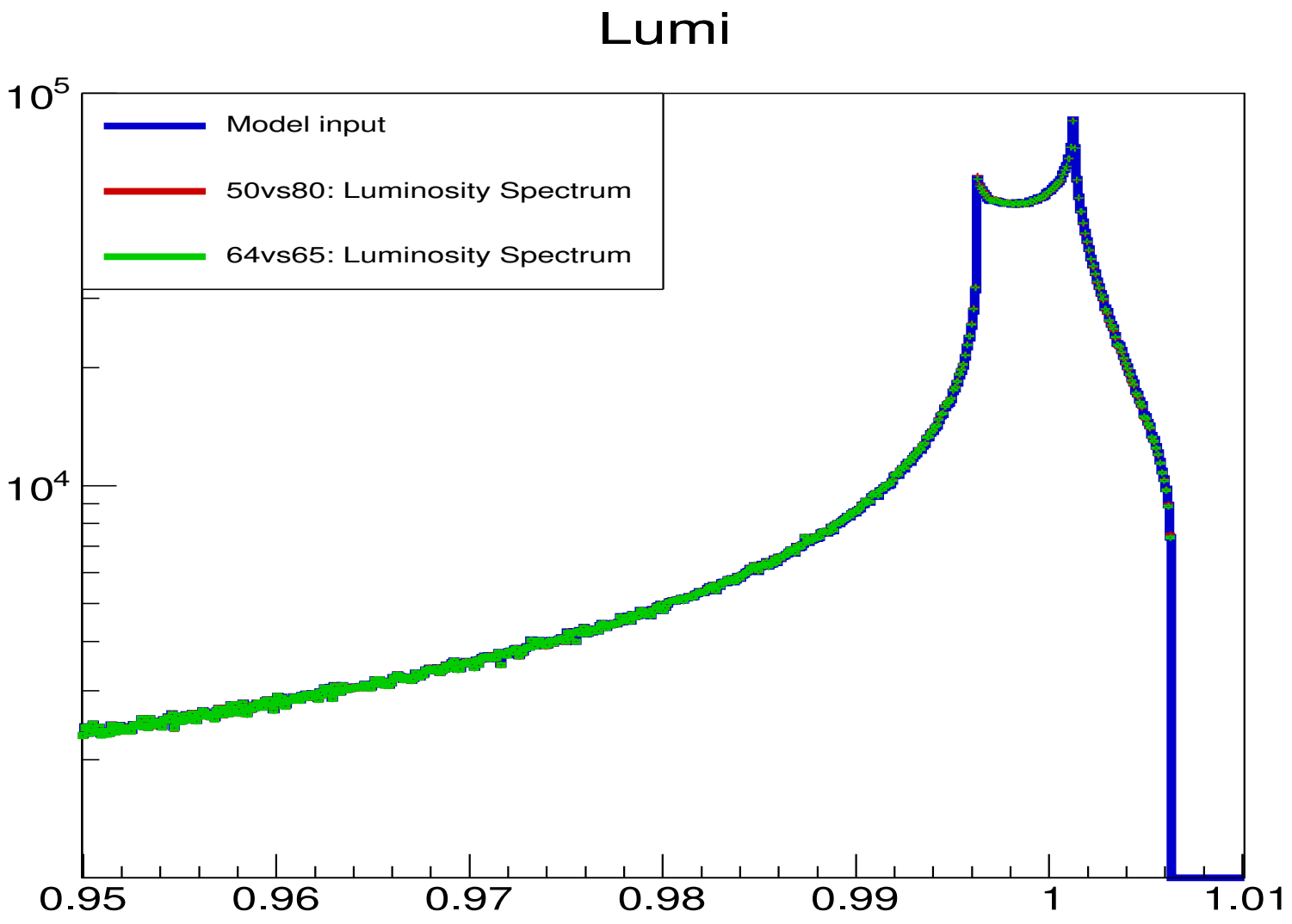
BackUp 1: χ^2 for larger range for Θ



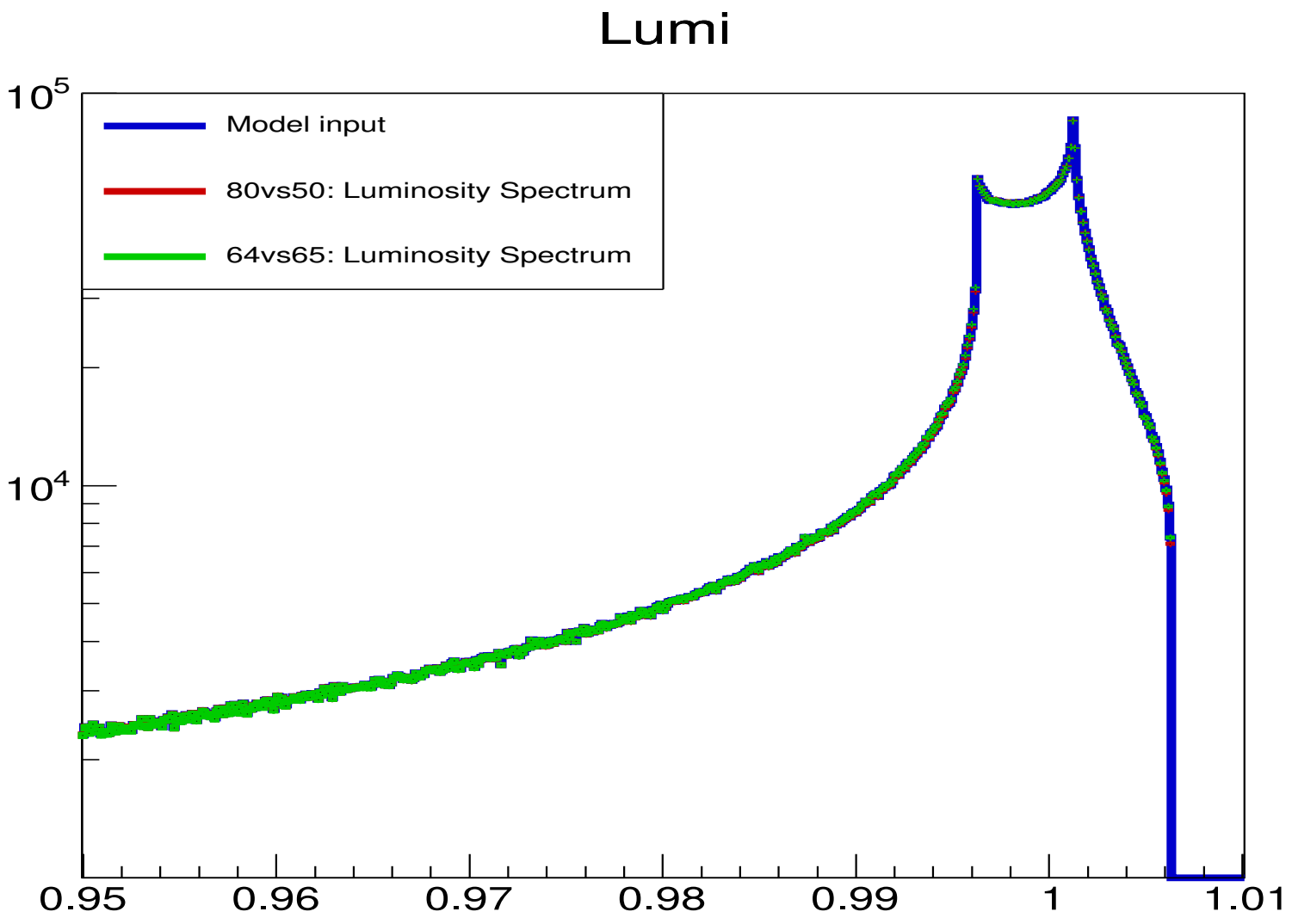
BackUp 2: χ^2 for parameter b



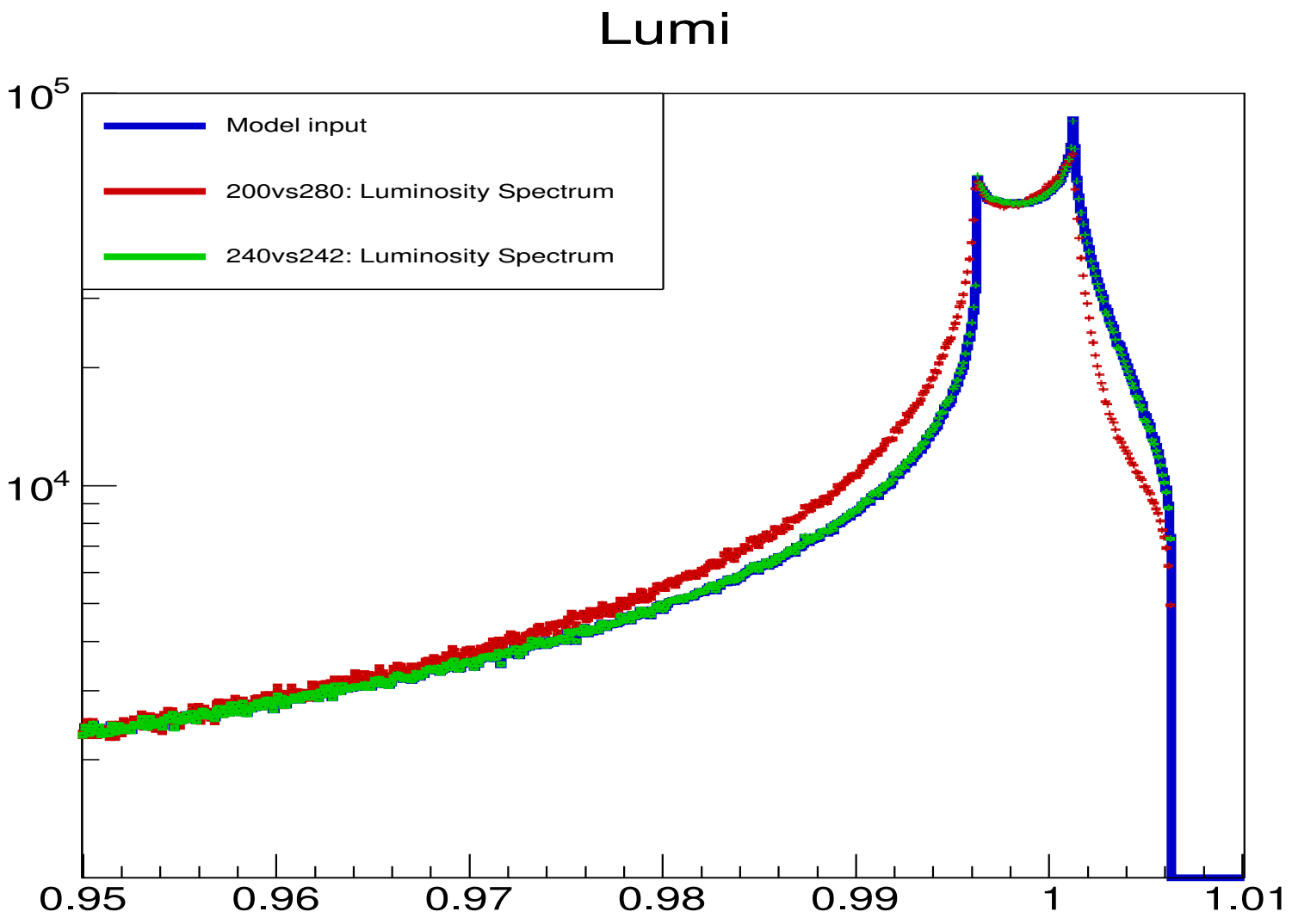
BackUp 3: Luminosity: 50vs80



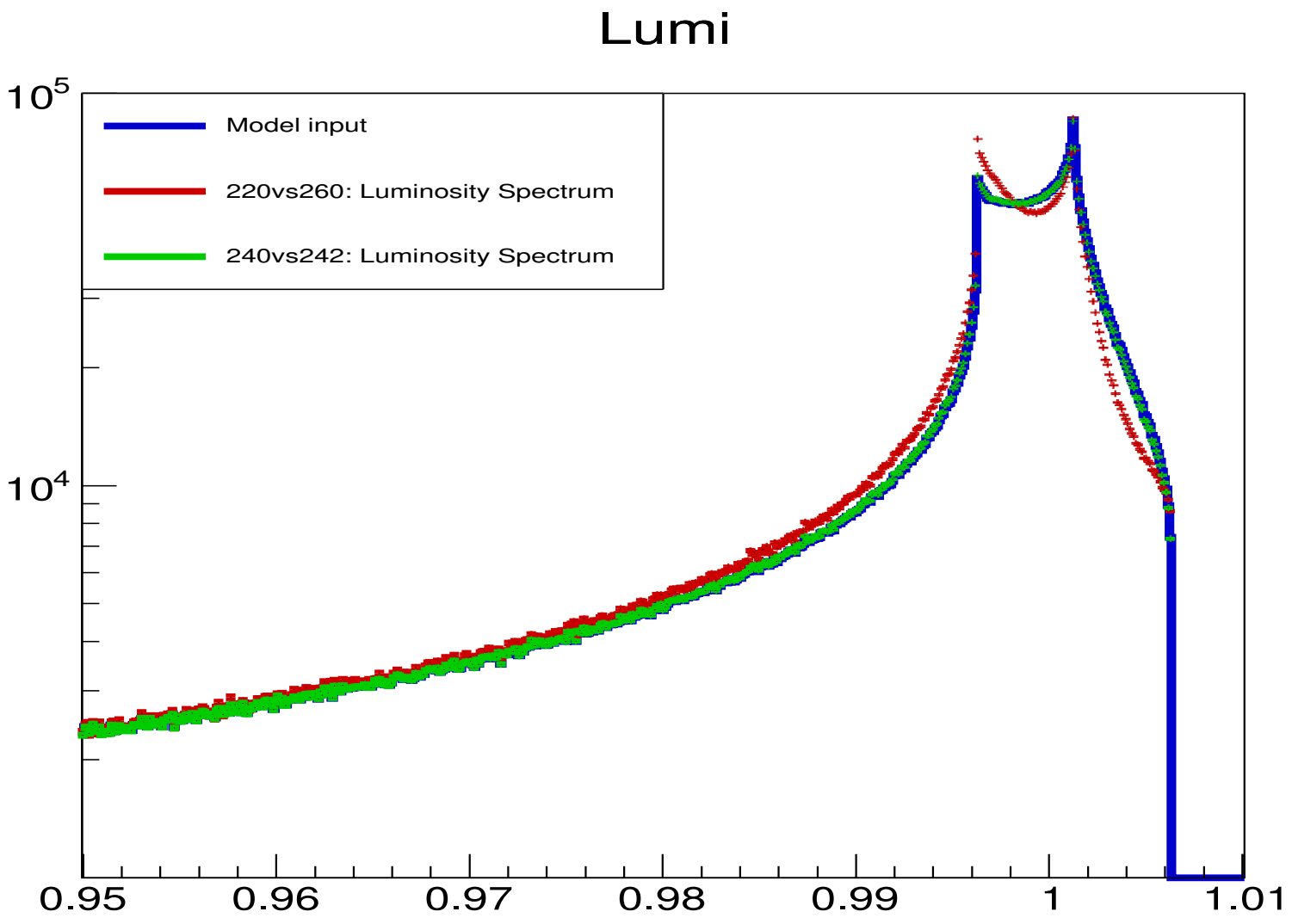
BackUp 4: Luminosity: 80vs50



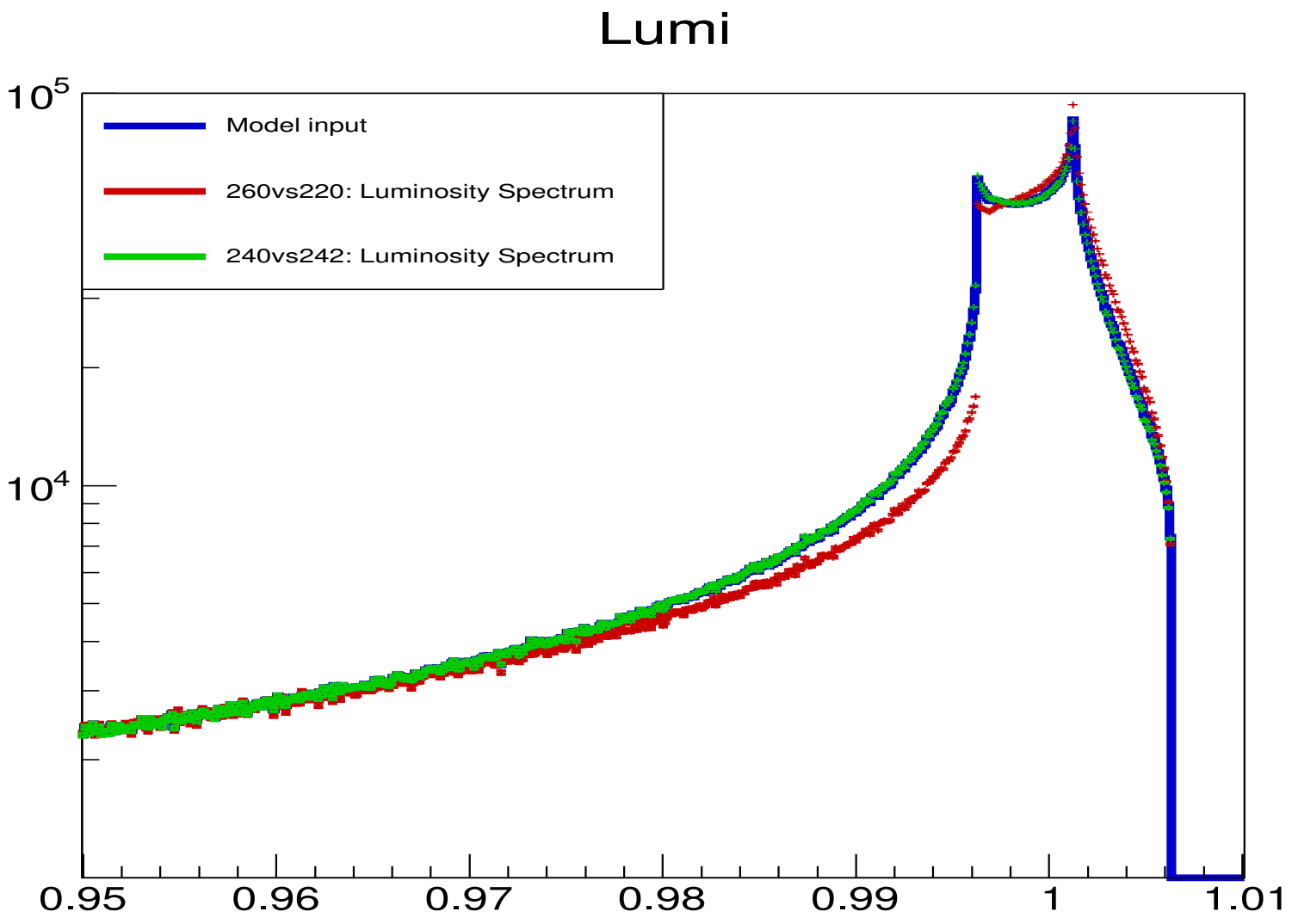
BackUp 5: Luminosity: 200vs280



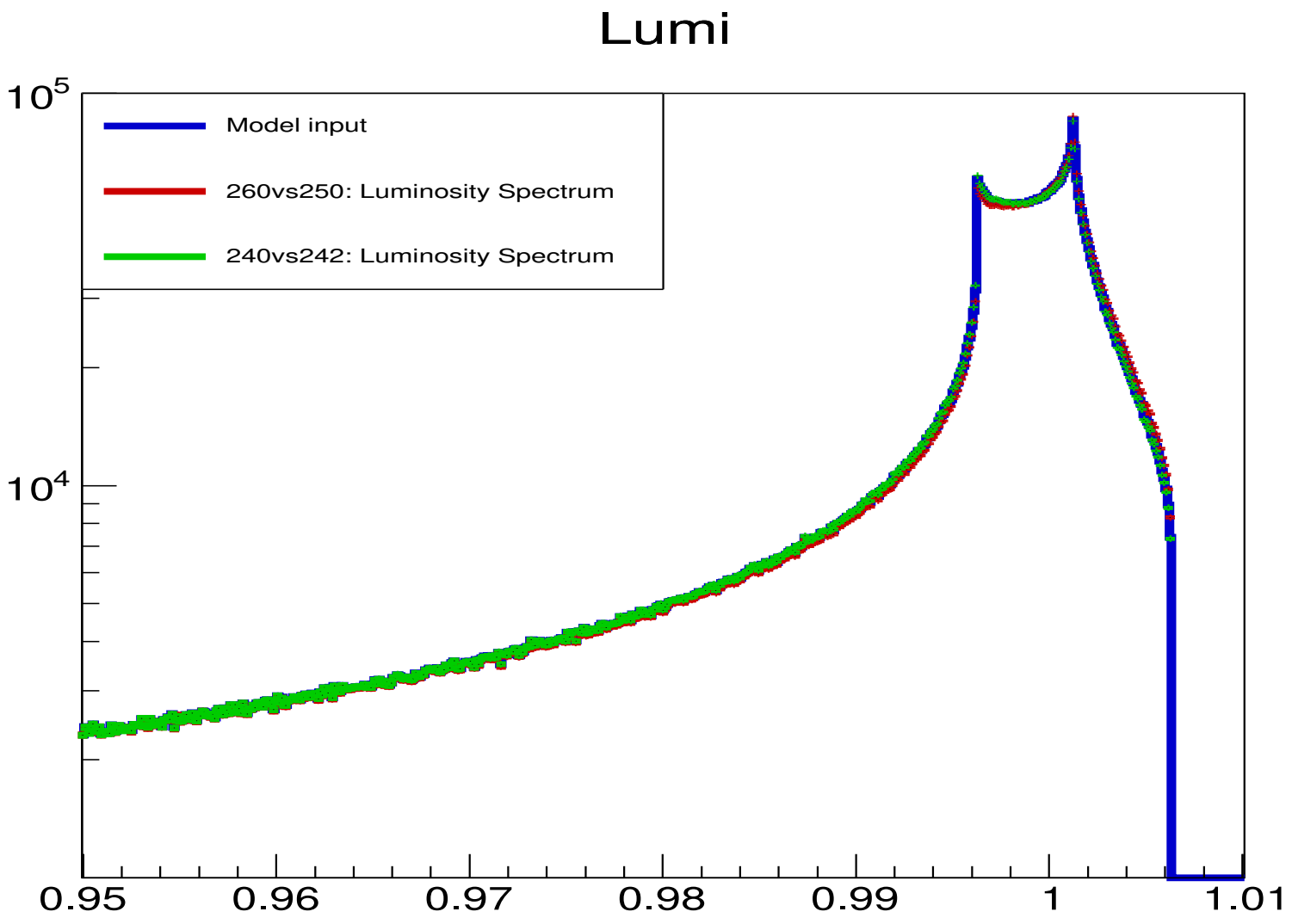
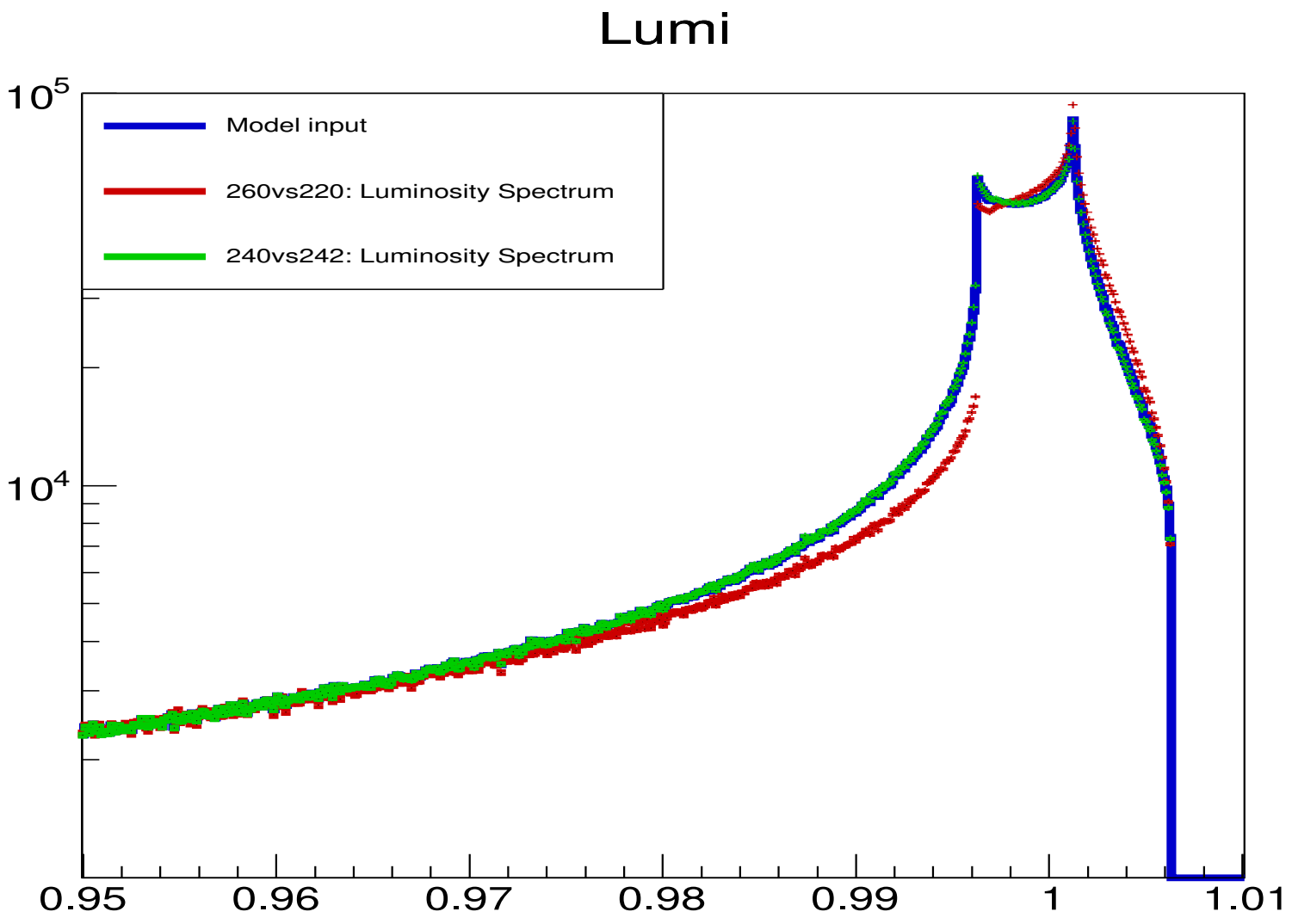
BackUp 6: Luminosity: 220vs260



BackUp 7: Luminosity: 260vs220



BackUp 8: Luminosity: 260vs250



BackUp 9: Luminosity: 220vs230