Electroweak corrections to the angular coefficients of Z-boson production at finite-p_T[1]

Rikkert Frederix, Timea Vitos

Lund University
Theoretical High Energy Physics

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[1] https://arxiv.org/abs/2007.08867

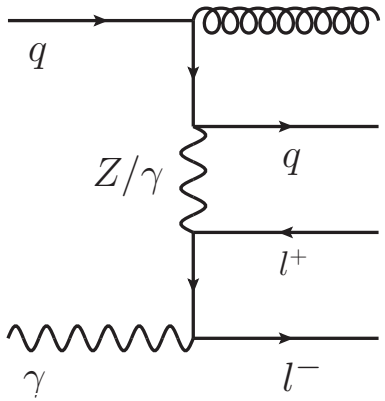
- **Expansion** of differential cross section in **spherical harmonics**

$$\frac{\mathrm{d}\sigma}{\mathrm{d}p_{T,Z}\mathrm{d}y_Z\mathrm{d}m_{ll}\mathrm{d}\Omega} \propto \Big((1+\cos^2\theta) + A_0\frac{1}{2}(1-3\cos^2\theta) + A_1\sin 2\theta\cos\phi + A_2\frac{1}{2}\sin^2\theta\cos 2\phi + A_3\sin\theta\cos\phi + A_4\cos\theta + A_5\sin^2\theta\sin 2\phi + A_6\sin 2\theta\sin\phi + A_7\sin\theta\sin\phi\Big)$$

- **Lam-Tung relation** at $O(\alpha^2\alpha_S)$: $A_0 - A_2 = 0$

- Experiments report **larger deviation** than theory predicts at $O(\alpha^2\alpha_S^3)$

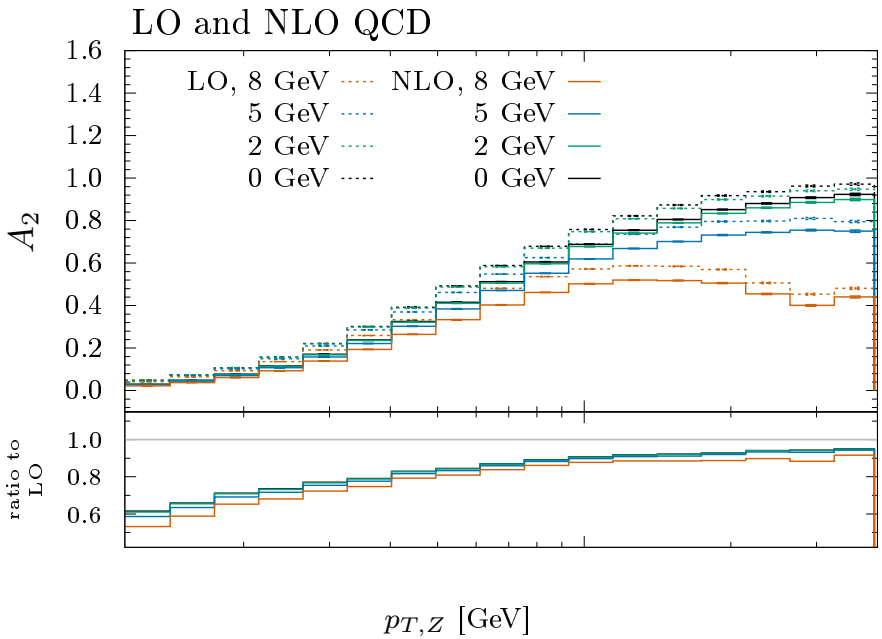
- **Double singularity** uncanceled at this order

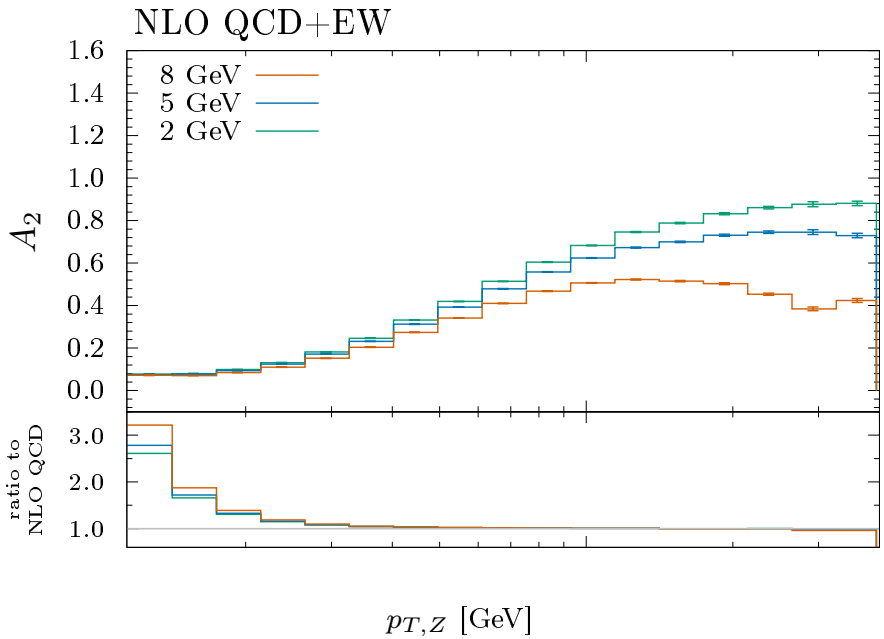


- Technical solution: **single lepton p_T cut**
- Investigate dependence on its value: p_T **cut** $\in [2,5,8]$ **GeV**

Results

Angular coefficients differentially in the lepton pair p_T

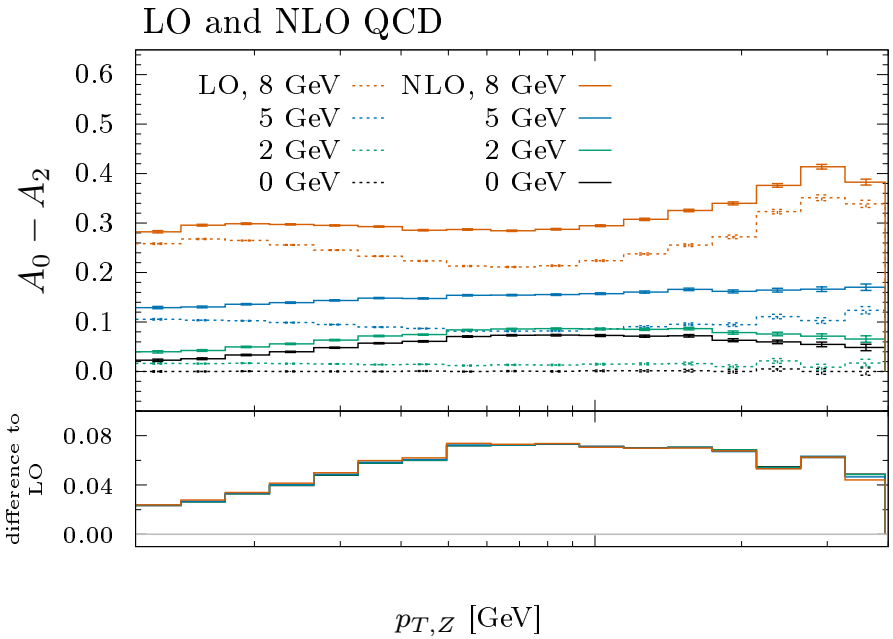


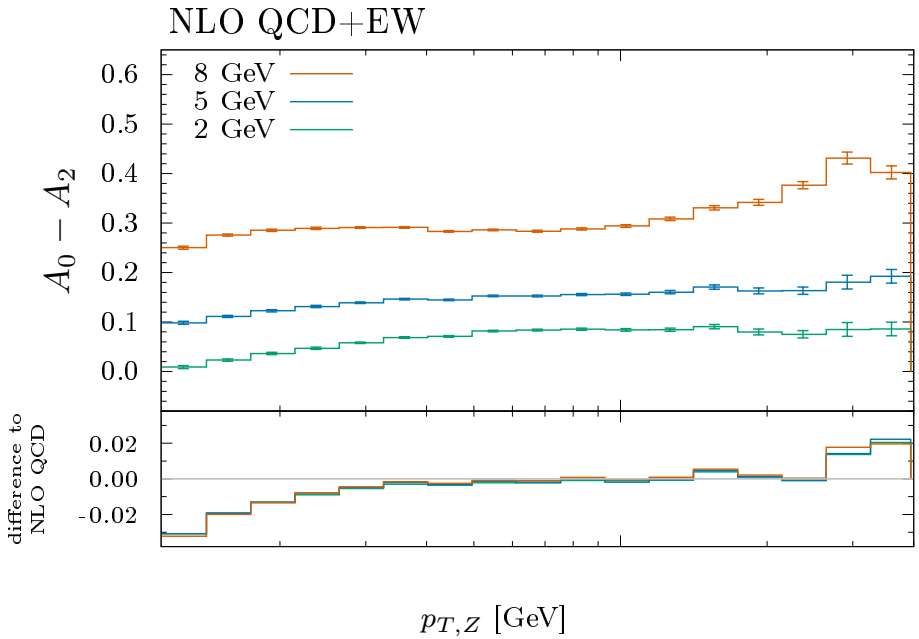


- **Small dependence** on cut value → safe extrapolation

Results

Lam-Tung relation $A_0 - A_2$





- **Electroweak corrections at low-p_T are not negligible**

See article for more details [2]

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