Photon + heavy-quark jet production at Tevatron and LHC

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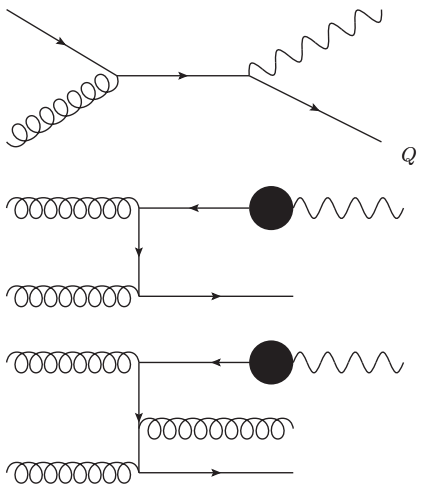
Overview

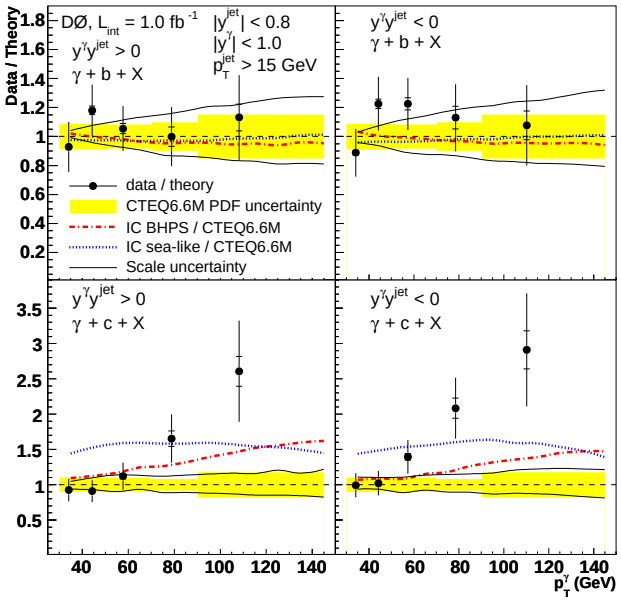
- $p\ p$ collisions at LHC at $\sqrt{s} = 7$ TeV opens a new era in research on particle physics, especially for QCD studies.
- Prompt photon at large-$p_\perp$ allows for probing perturbative QCD at NLO and putting constraints on PDFs and FFs.
- Our interesting process is $pp/p\bar{p} \to \gamma + Q + X$

Foresee

- Cross check with previous calculation[1], as well as understand Tevatron data[2] [3].

Discrepancy between data and theory





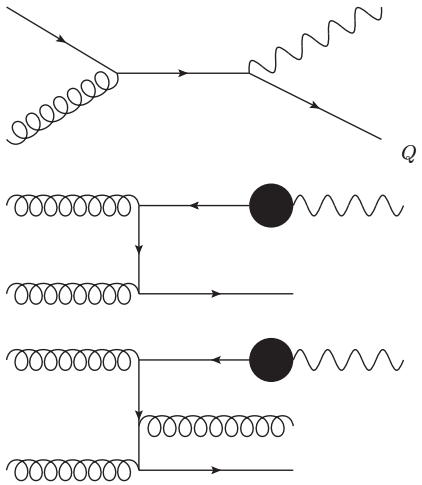
[1] T.P. Stavreva, and J.F. Owens, Phys. Rev. **D 79** (2009) 054017.

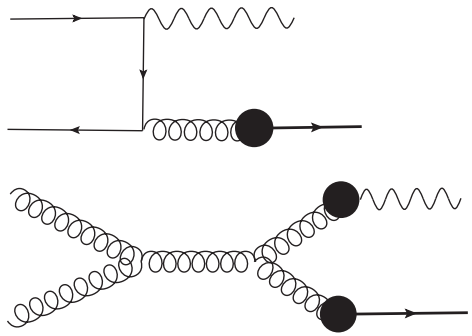
[2] T. Aaltonen and others, Phys.Rev. **D 81** (2010) 052006.

[3] V.M. Abazov et al. Phys. Rev. Lett. **102** (2009) 192002.

Foresee

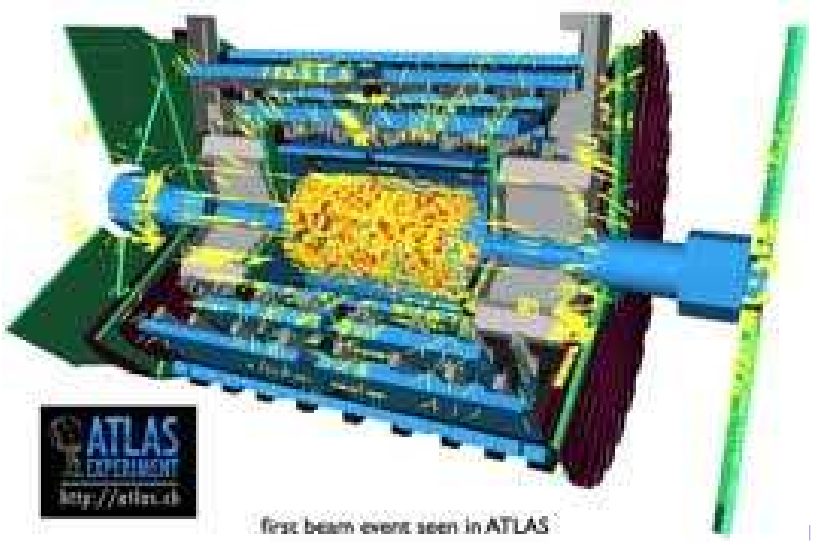
- Cross check with previous calculation, as well as understand Tevatron data.
- Improving the calculation by including fragmentation of partons into heavy-quarks in the final state of the partonic process.





Foresee

- Cross check with previous calculation, as well as understand Tevatron data.
- Improving the calculation by including fragmentation of partons into heavy-quarks in the final state of the partonic process.
- Compare with first LHC data at 7TeV



first beam event seen in ATLAS

Method

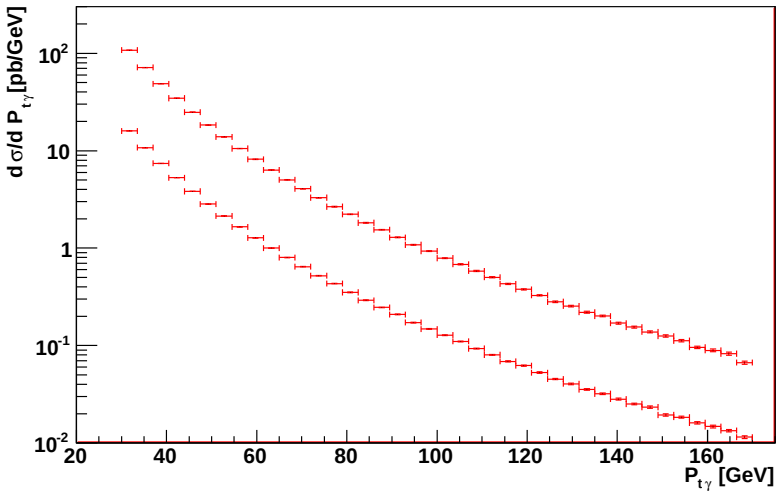
- Work based on the PHOX generators[4]
- Pick up the corresponding process to have a cross check
- Modify the PHOX generators to allow for the fragmentation of partons into heavy quarks.

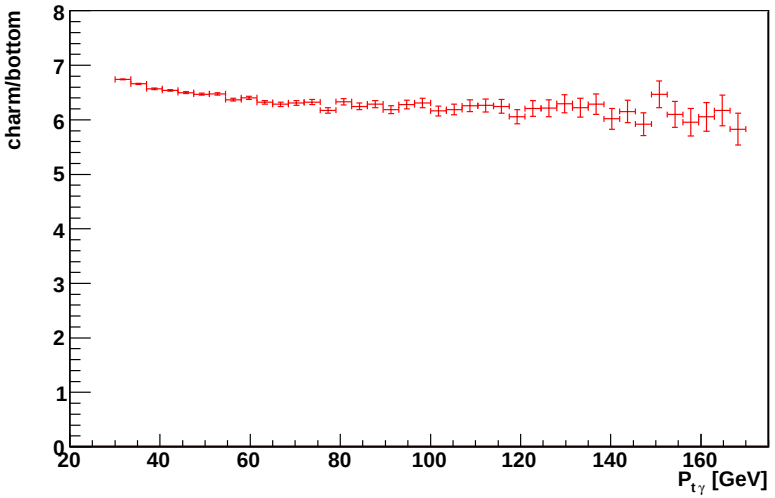
[4] http://lapth.in2p3.fr/PHOX_FAMILY/main.html

Born results

Left: γ+c and γ+b at LHC

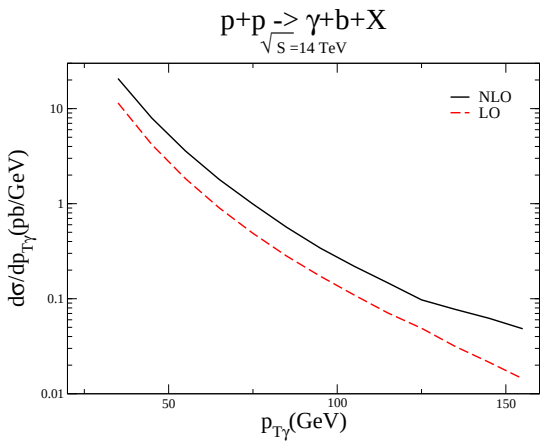
Right: (γ+c)/(γ+b) ratio at LHC

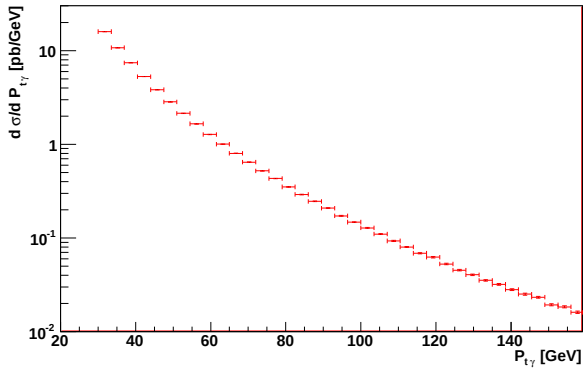


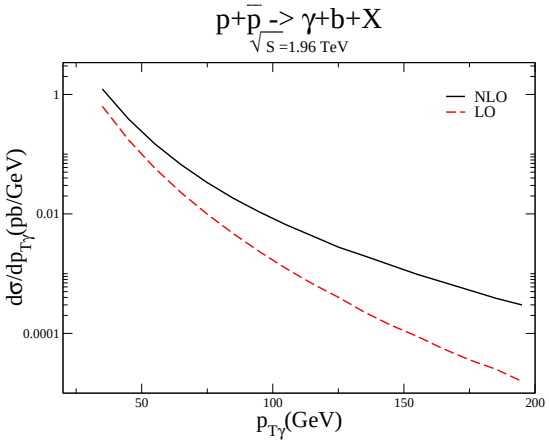


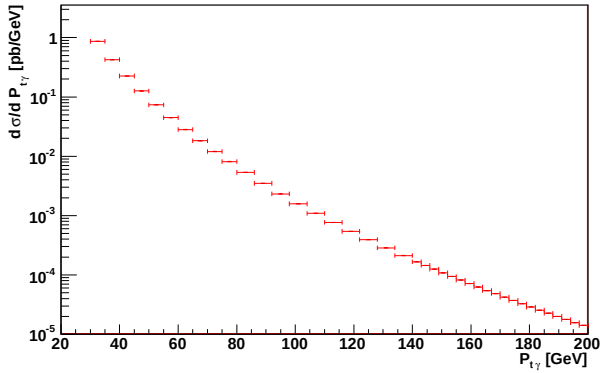
Cross check at Born

Good agreement with previous calculatior at Born level









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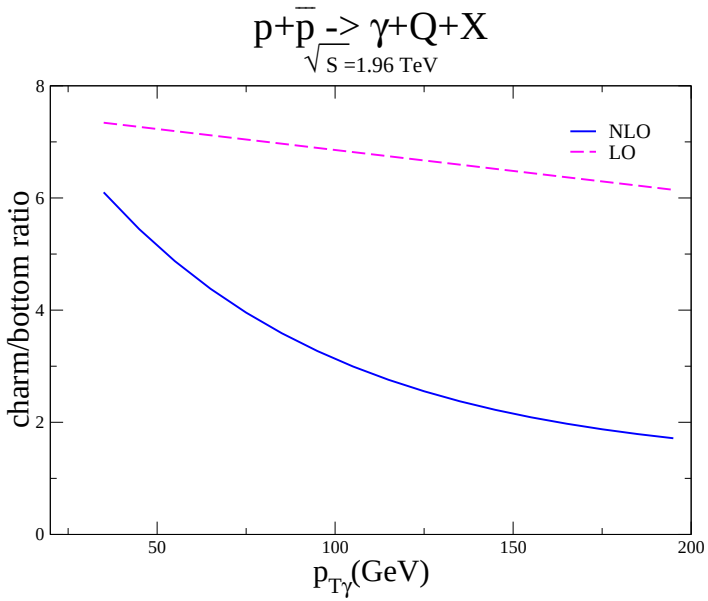

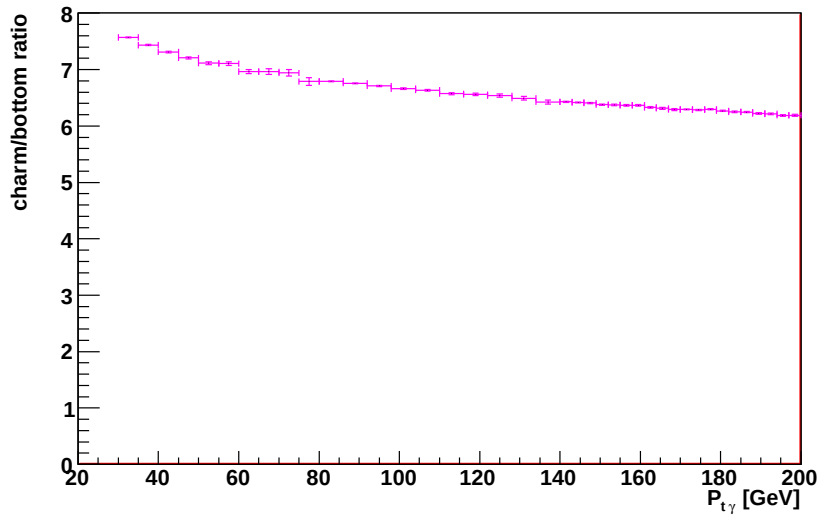

Conclusion and outlook

- At Born level, good agreement results were obtained
- NLO calculation is in progress
- Contribution of partons fragmenting into heavy-quarks will be included
- Phenomenology at Tevatron and LHC.