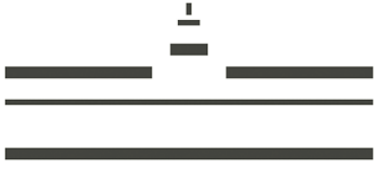
RTG Inauguration Retreat

Florian Herrmann

24-26.11.2015



Westfälische
Wilhelms-Universität
Münster

Graduiertenkolleg 2149
Research Training Group

Academic Education

2006-2010 Protestant Theology (Gießen/Marburg)

- Master's Thesis: Death in Theology and Biology/Evolution

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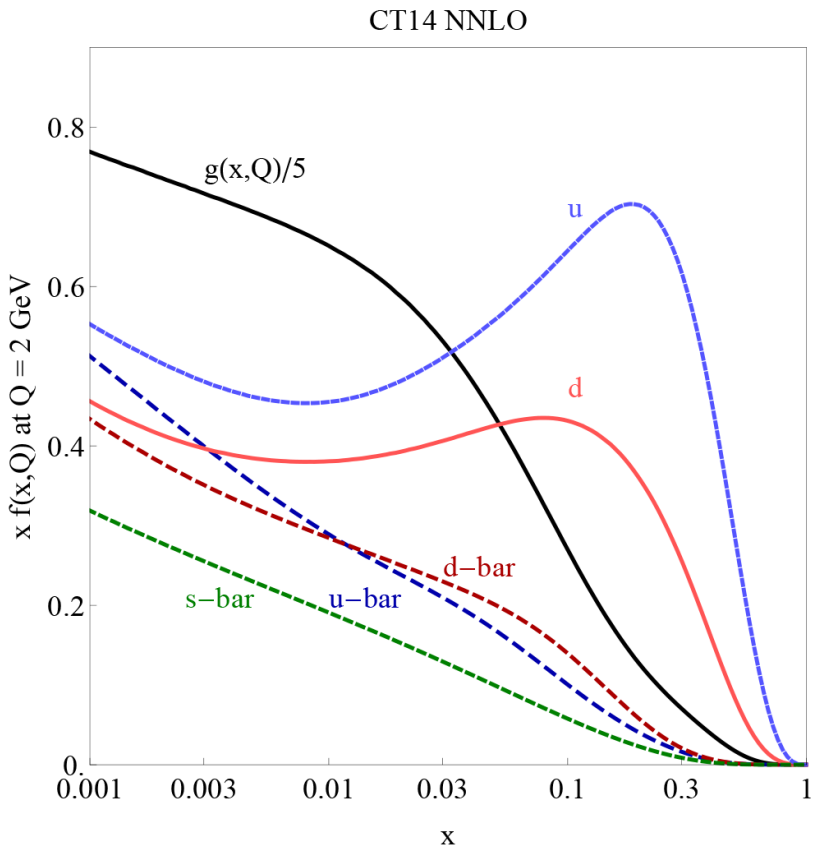
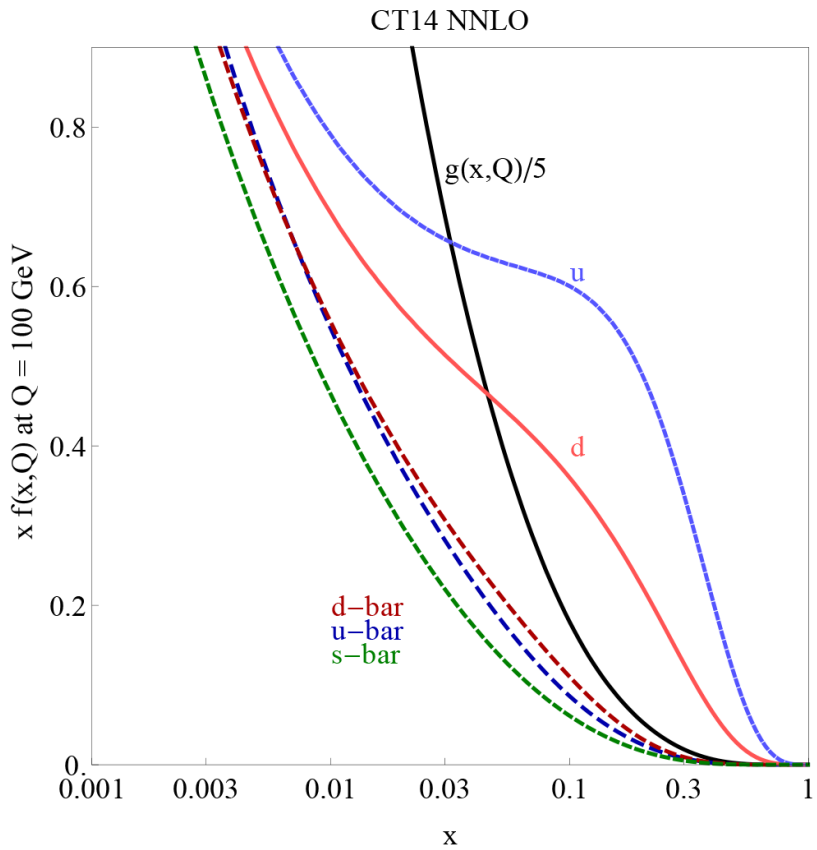
Since 2015 PhD Student in the RTG

- Group of Prof. Wessels & PD Dr. Klein-Bösing, ALICE
- Heavy Flavour Correlations

Master's Thesis

Evolution of Parton Distribution Functions





Master's Thesis

Evolution of Parton Distribution Functions

DGLAP Evolution Eqs.

$$\frac{\partial}{\partial t}\begin{pmatrix} q_i(x,t) \\ g(x,t) \end{pmatrix} = \frac{\alpha_s(t)}{2\pi}\sum_{j=1}^{2n_f}\int_x^1 \frac{dz}{z}\left[\begin{pmatrix} P_{q_iq_j}\left(\frac{x}{z}\right) & P_{q_ig}\left(\frac{x}{z}\right) \\ P_{gq_j}\left(\frac{x}{z}\right) & P_{gg}\left(\frac{x}{z}\right) \end{pmatrix}\begin{pmatrix} q_j(z,t) \\ g(z,t) \end{pmatrix}\right]$$

$$\text{with } t = \ln Q^2$$

Master's Thesis

Evolution of Parton Distribution Functions

DGLAP Evolution Eqs.

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$$\text{with } t = \ln Q^2$$

The Mellin Transformation

$$f(n) = \int_0^1 dx\, x^{n-1} f(x), \qquad f(x) = \frac{1}{2\pi i}\int_{c-i\infty}^{c+i\infty} dn\, x^{-n} f(n)$$

PhD Project

Heavy Flavour Correlations at ALICE

Group of Prof. Wessels, PD Dr. Klein-Bösing

- ALICE

PhD Project

Heavy Flavour Correlations at ALICE

Group of Prof. Wessels, PD Dr. Klein-Bösing

- ALICE

Heavy Flavour Correlations

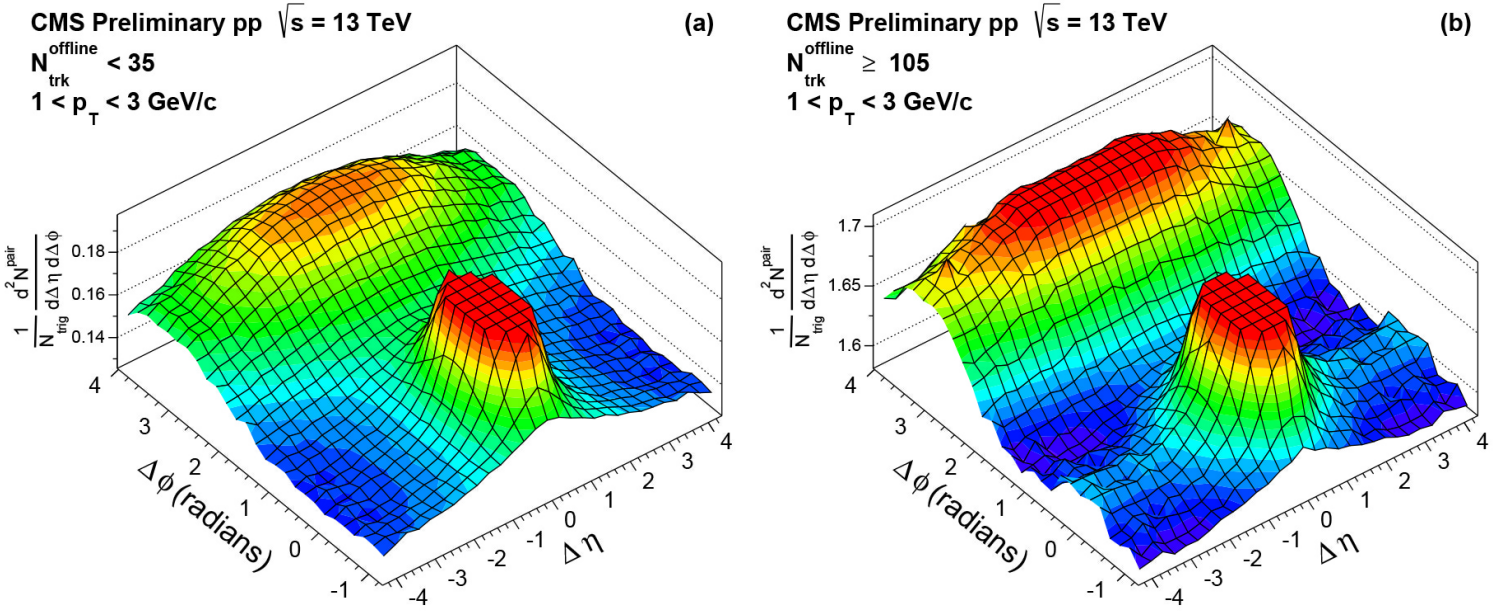
- Correlations
  - Angular Correlations
  - Anisotropic/elliptic flow
- Heavy Flavour

PhD Project

Heavy Flavour Correlations at ALICE

Angular Correlations

$$C(\Delta\eta,\Delta\phi) = \frac{S(\Delta\eta,\Delta\phi)}{B(\Delta\eta,\Delta\phi)} = \frac{1}{N^{\text{trigger}}} \frac{\mathrm{d}^2N}{\mathrm{d}\Delta\eta\mathrm{d}\Delta\phi}$$

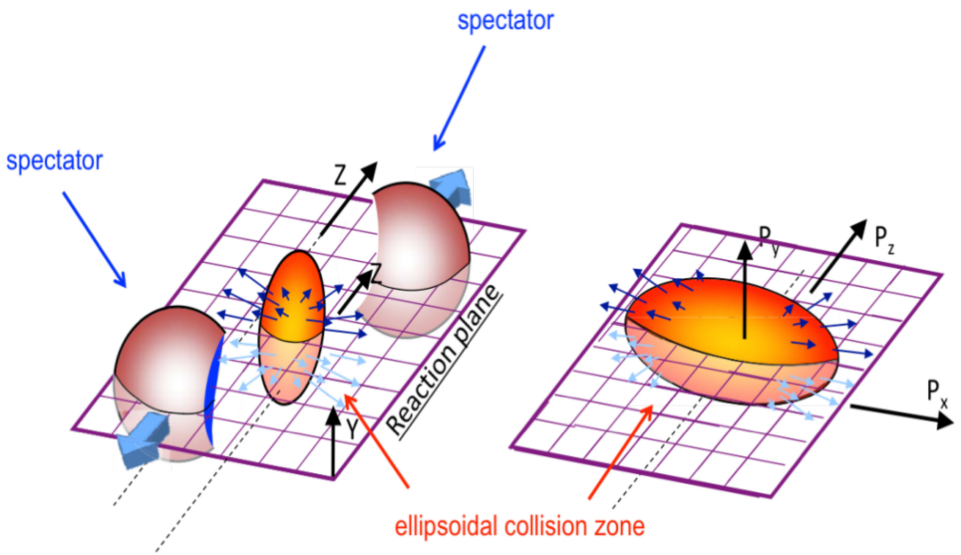


PhD Project

Heavy Flavour Correlations at ALICE

Azimuthal Anisotropy

$$\frac{\mathrm{d}N}{\mathrm{d}(\phi-\psi_n)} \propto \frac{1}{2\pi}\left[1+2\sum_{n=1}^{\infty} v_n \cos(n[\phi-\psi_n])\right]$$



initial spatial anisotropy → momentum space anisotropy

Master's Thesis

Evolution of Parton Distribution Functions

Solution in x-Space

Reduce problem to

$$q_\alpha(t) = \sum_{\beta=0}^{\alpha} M_{\alpha\beta}(t) q_\beta(t_0) \quad \text{with} \quad M_{\alpha\beta}(t_0) = \delta_{\alpha\beta}$$

$$\Rightarrow \frac{\partial M_{\alpha\beta}(t)}{\partial t} = \frac{as(t)}{2\pi} \sum_{\gamma=\beta}^{\alpha} P_{\alpha-\gamma}(t) M_{\gamma\beta}(t)$$

Master's Thesis

Evolution of Parton Distribution Functions

Solution in Mellin-Space

The Mellin Transformation

$$f(n) = \int_0^1 \mathrm{d}x\, x^{n-1} f(x), \qquad f(x) = \frac{1}{2\pi \mathrm{i}} \int_{c-\mathrm{i}\infty}^{c+\mathrm{i}\infty} \mathrm{d}n\, x^{-n} f(n)$$

The Mellin convolution becomes a product so that

$$\frac{\partial \boldsymbol{q}(n,t)}{\partial t} = \frac{\alpha_s(t)}{2\pi} \boldsymbol{P}(n, \alpha_s(t)) \boldsymbol{q}(n,t).$$