

LEADING LEPTONIC RADIATIVE CORRECTIONS

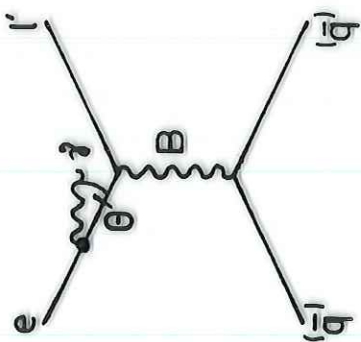
FOR (NON)-STANDARD PROCESSES IN
ep-SCATTERING

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ZEUTHEN

- 1) BASIC PROCESSES
- 2) DEEP INELASTIC SCATTERING
- 3) GENERAL SCENARIO
- 4) EXAMPLE : HEAVY FLAVOUR PRODUCTION

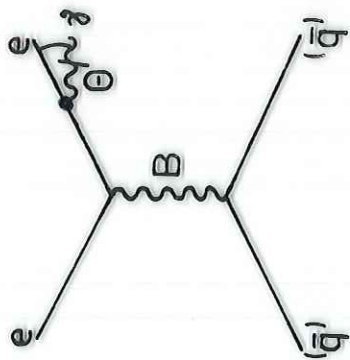
1. BASIC PROCESSES

IS



a)

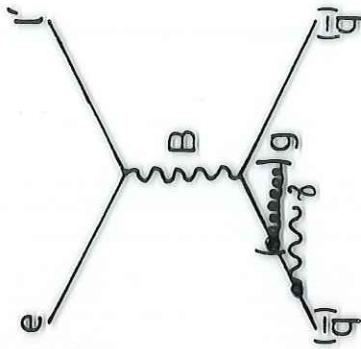
FS



b)

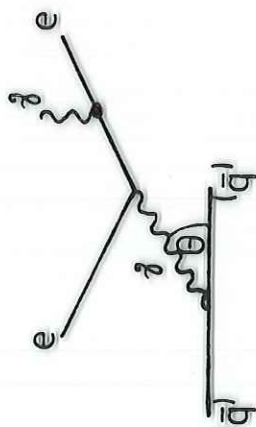
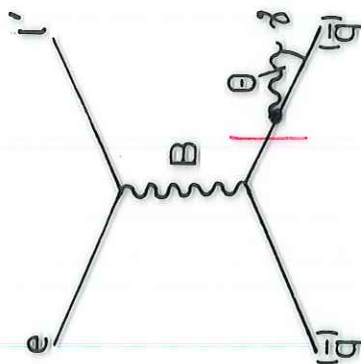
$$0 \left(1 + \frac{3\alpha\alpha_s}{4\alpha_s}\right)$$

c)



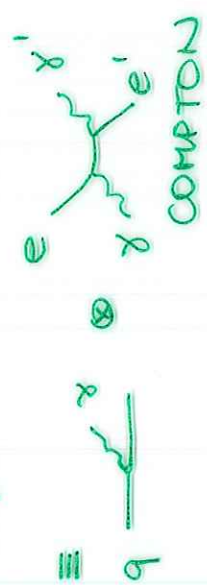
d)

KLN



e)

f)



BREMSSTRAHLUNG:

$$e: \int_F \frac{d\sigma^1}{dx dy} = \frac{\alpha}{2\pi} \ln\left(\frac{Q^2}{m_e^2}\right) \int_0^1 dz \frac{1+z^2}{1-z}$$

$$\left\{ \theta(z-z_0) \frac{y}{\hat{y}} \frac{1}{z^a} \frac{d\sigma_B}{dx dy} \Big|_{\hat{x}, \hat{y}, \hat{s}} - \frac{d\sigma_B}{dx dy} \right\}$$

$$q: \int \frac{d\sigma^1}{dx dy} = \frac{\alpha}{2\pi} \sum_{i=q, \bar{q}} e_i^2 \ln\left(\frac{Q^2}{\Lambda^2}\right) \int_0^1 dz \frac{1+z^2}{1-z}$$

$$\left\{ \theta(z-z_0) \frac{y}{\hat{y}} \frac{1}{z^a} C_i(\hat{x}, \hat{y}, \hat{s}) - C_i(x, y, s) \right\}$$

$$\text{Where: } d\sigma_B/dx dy = \sum_{i=q, \bar{q}} C_i(x, y, s)$$

$$\hat{x} = \hat{x}(x, y, z)$$

$$\hat{y} = \hat{y}(x, y, z)$$

$$\hat{s} = \hat{s}(s, z)$$

$$z_0 = z_0(x, y)$$

DIFFERENT VALUES & FUNCTIONS

$a, \hat{x}, \hat{y}, \hat{s}, z_0$ FOR:

e, q - BREMSSTRAHLUNG, ALSO

DEPENDENT ON WHERE x & y

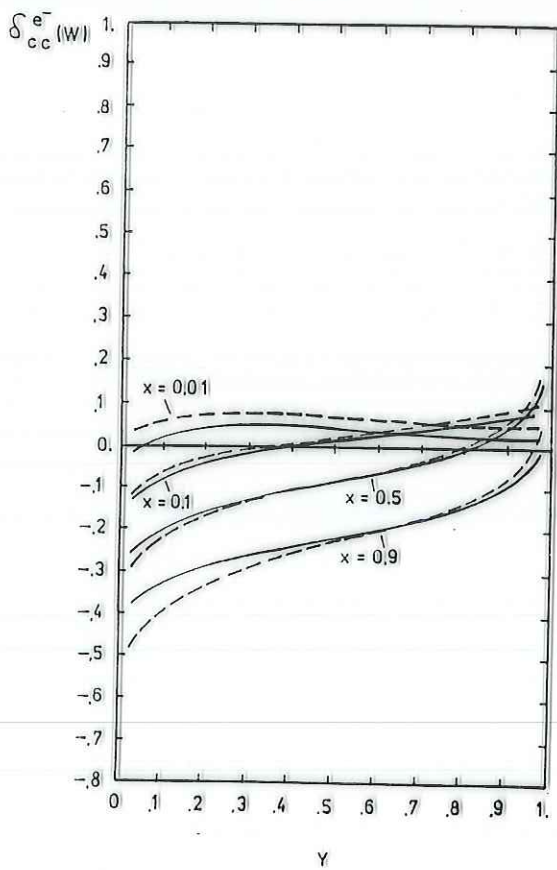
ARE DEFINED : LEFT. / HADR. VERTEX.

COMPTON:

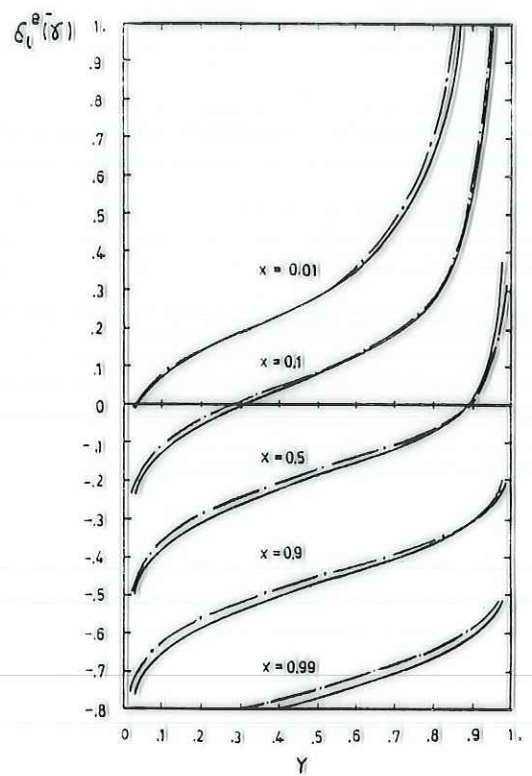
$$\frac{d\sigma^c}{dx dy} = \frac{\alpha^3}{8x} \ln \frac{Q^2}{\Lambda^2} \int_x^1 \frac{dz}{z^3} F_2(z, Q^2) \frac{z^2 + (x-z)^2}{x(1-y)} \Upsilon_+$$

2. Dis

CC-Dis



NC(γ) - Dis



electron - measurement

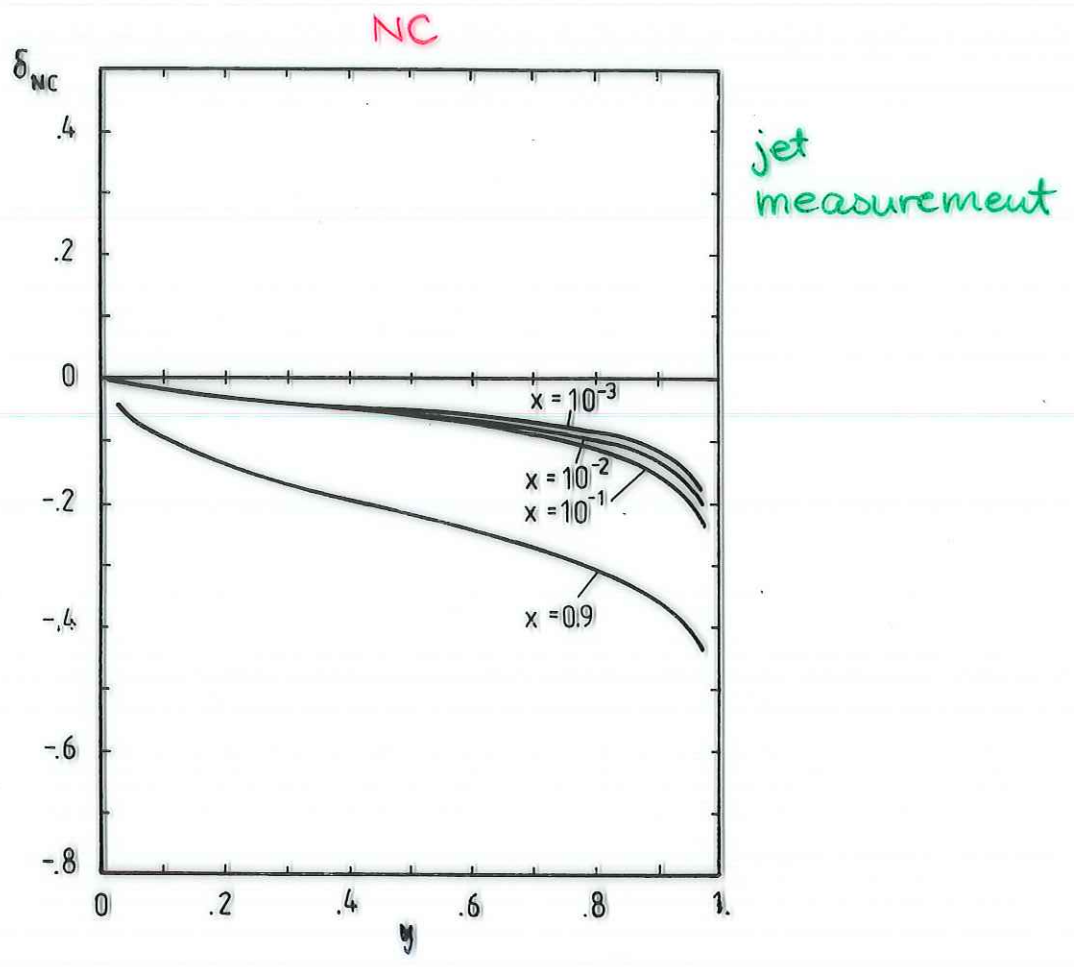
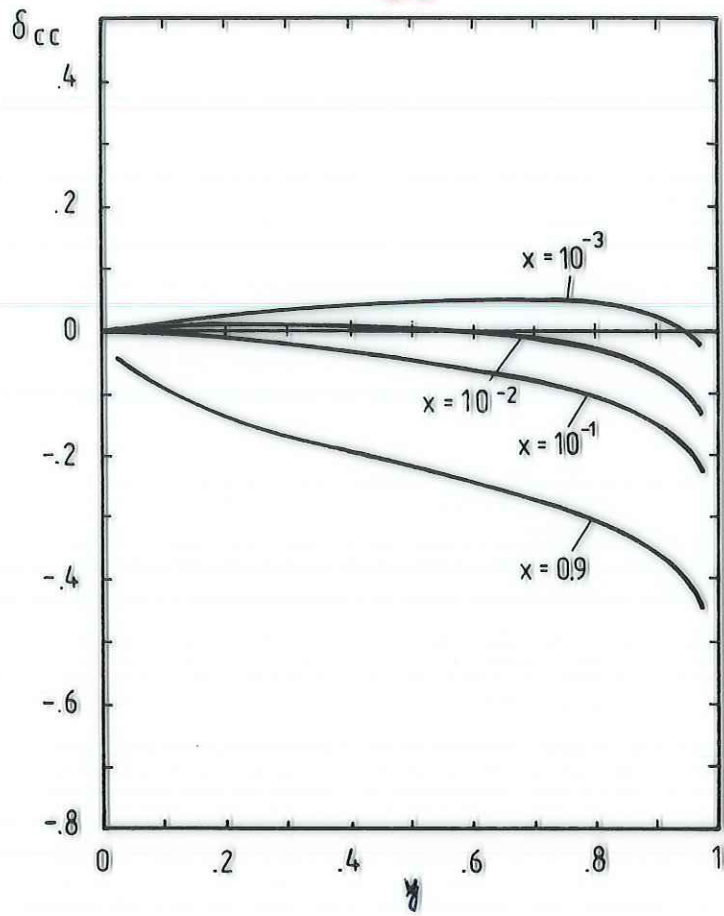


Fig. 2a

CC



JET-
measurement

Fig. 2b

3. GENERAL SCENARIO

LLA - QED CORRECTION TO SOME PROCESS:

RECEIPE:

- $d\sigma/dx dy$ BORN
- FIND SUITABLE FRAME IN WHICH YOU MEASURE x & y (e, h, ...)

- CLASSIFY REQUIRED GRAPHS:

ISBS } e
FSBS }

COMPTON ?



- q-BREMSSTRAHLUNG (IS) → PART OF QCD-CORR.
* $(1 + \frac{3\alpha e_q^2}{4\alpha_s})$

- $\frac{d\sigma}{dx dy} \sim O\left(\frac{\alpha}{2\pi}\right) \cdot \ln\left(\frac{Q^2}{m_e^2}\right) \dots$

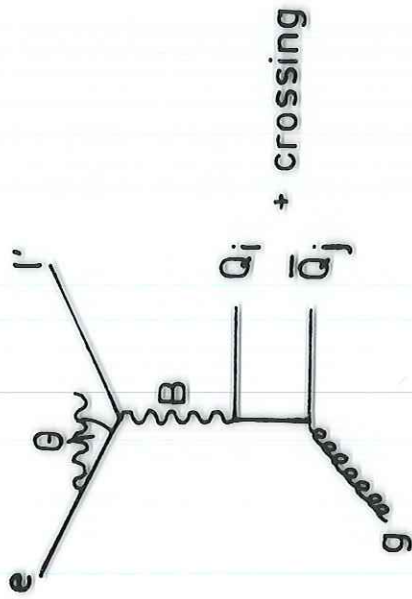
MAY BE CALCULATED USING RADCOR

AVAILABLE UPON REQUEST AFTER APRIL 30

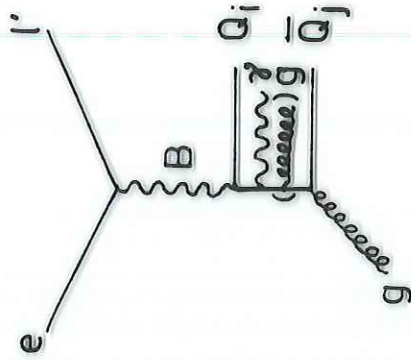
→ HIKBLU @ DHHDESYS

→ USER MAY CHANGE:
 $d\sigma/dx dy$; $x q_i^{(\pm)}(x, Q^2)$.

4. HEAVY FLAVOUR PRODUCTION



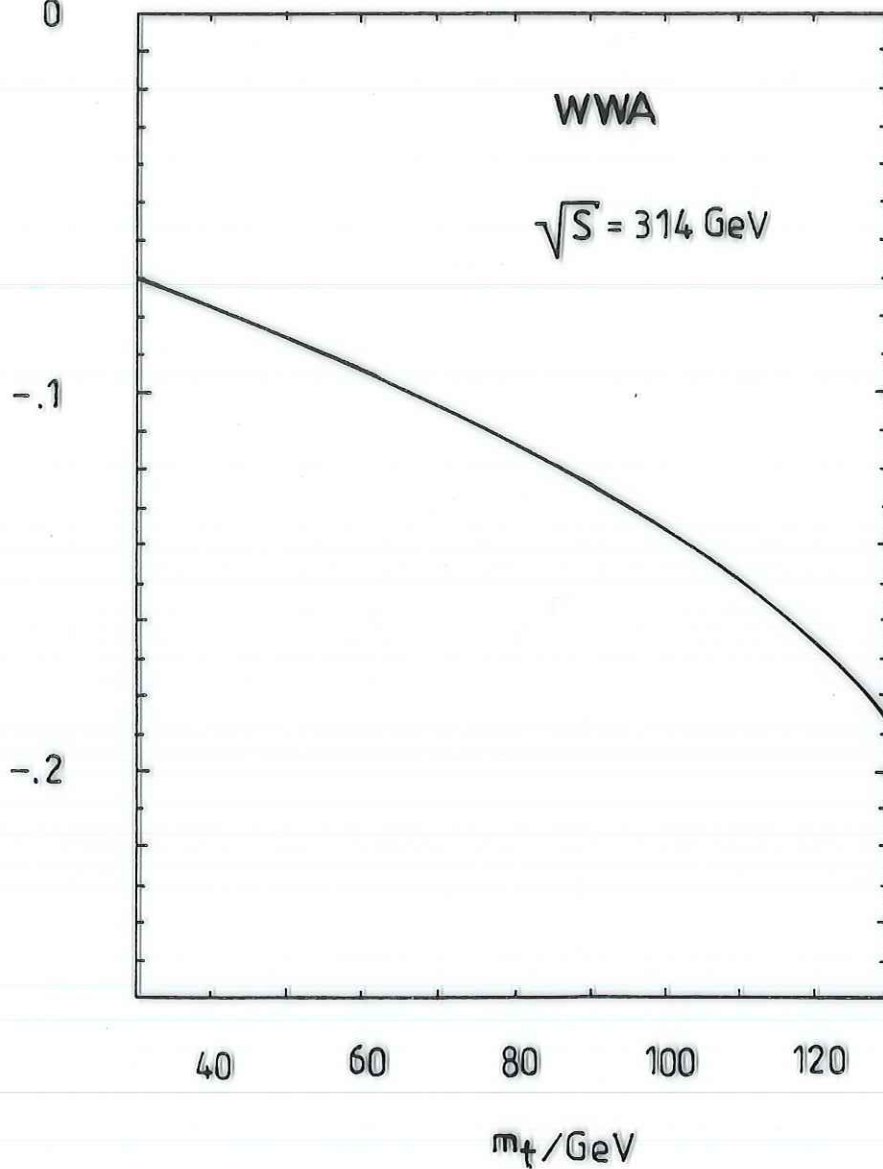
a)



b)

$$O\left(1 + \frac{3\alpha_s^2}{4\alpha_s}\right) \times QCD\text{-corr.}$$

$$\delta_{t\bar{t}} = \frac{\sigma_{t\bar{t}}^{(1)}}{\sigma_{t\bar{t}}^{(0)}}$$



$$\delta_{c\bar{c}} = -3.61 \cdot 10^{-2} \quad m_c = 1.5 \text{ GeV}$$

$$\delta_{b\bar{b}} = -4.36 \cdot 10^{-2} \quad m_b = 4.5 \text{ GeV}$$

Fig.6