E00-108 Duality in Meson Electroproduction

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Status:

E00-108 approved (PAC-18)
for 20 days @ 6.0 GeV

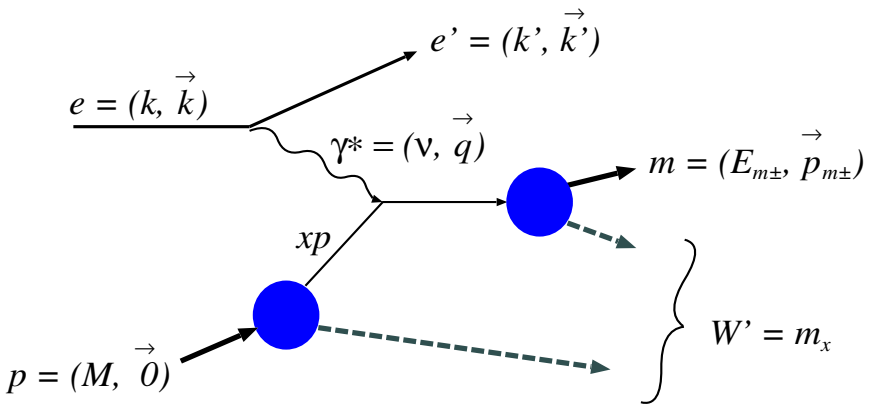
"Scheduled":

06/25/03 - 07/08/03 @ 5.496 GeV
08/13/03 - 08/29/03 @ ~~5.299~~ GeV
5.248

E00-108 Goals

- Does the cross-section factorize at low energy ?
- Can we reproduce high energy fragmentation functions ?
- Does Duality hold at low energy in semi-inclusive meson production ?

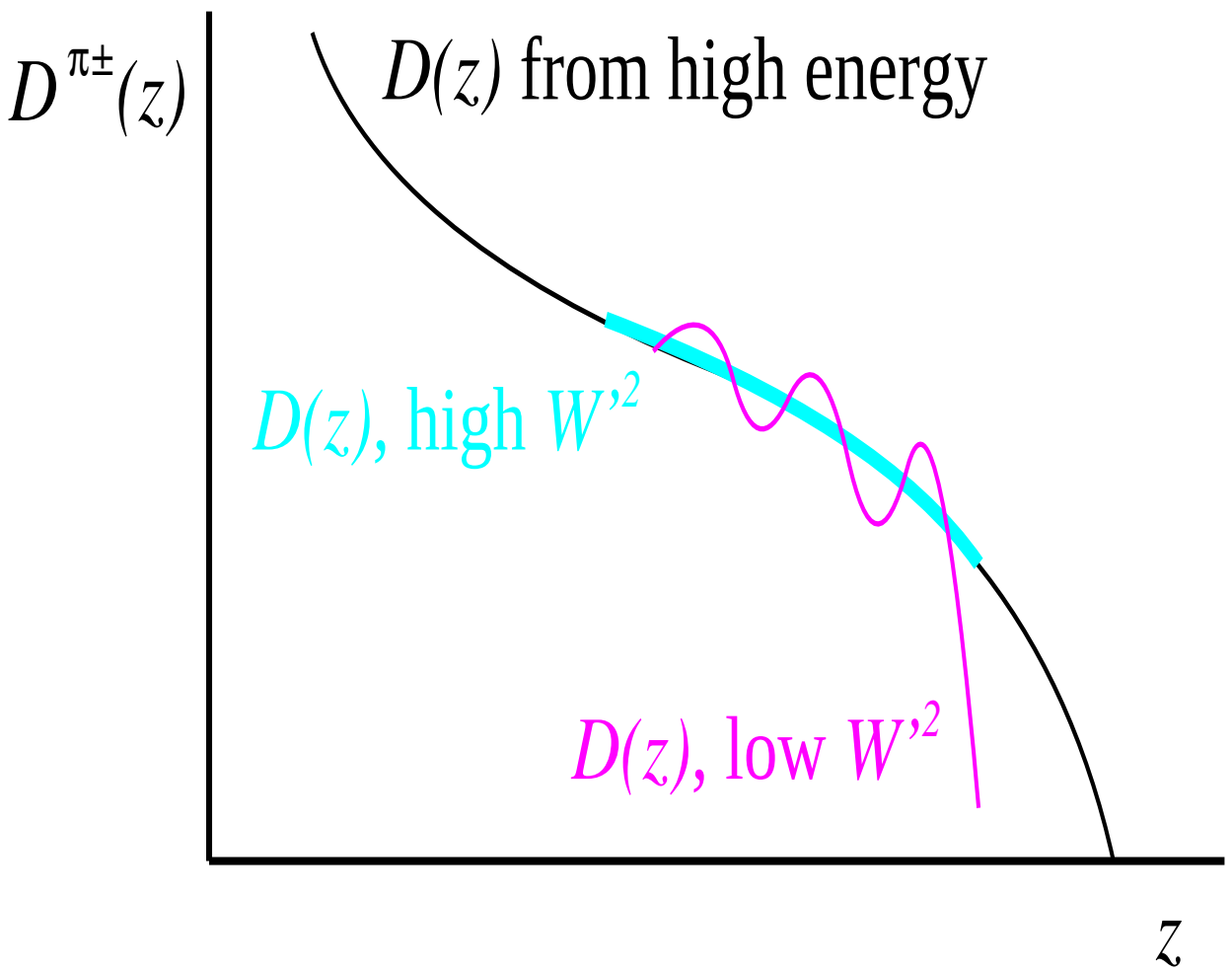
E00-108 Definitions, Formulas, and such...



- $\sigma \sim f(z)\, q(x,Q^2)$
- ***f(z)*** ***- quark hadronization***
- $g(x,Q^2)$ ***- hard quark-photon interaction***

$$N^{\pi^\pm}(x,z) \propto \sum_i e_i^2 \left[q_i(x)\, D_{q_i}^{\pi^\pm}(z) + \overline{q}_i(x)\, D_{\overline{q}_i}^{\pi^\pm}(z) \right]$$

E00-108 Duality in Semi-inclusive Meson Production



E00-108 Experimental Plan

- Take inclusive (e,e') and semi-inclusive (e,e'$\pi^{+/-}$) data on LH2, LD2, and Al
- Extract $\pi^{+/-}$ (K) cross sections (Yields) on p and n
- Data scans in z and x
- Allow some overlap between the two sets of data

E00-108 Experimental Setup

- **electron arm: SOS**
  DC, Hodo, Cerenkov, Cal.

- **meson arm: HMS**
  DC, Hodo, Cer., Cal., Aerogel

- **DAQ:** single e' and e'-h COIN

- **Trigger:** 3/4 (HMS, SOS) x Cer.

- **PID:**
  HMS(+) - π^+/K^+ / p,e^+
  HMS(-) - π^-/K^- / e^-
  SOS - e^- /p^-/K^-

E00-108 Expected Results

- ***Statistical: 3-5%****
- ***Systematic: 5-10%***

* - Rates based on 4cm LH2 @ 50μA
  - Assumes factorization...
  - Takes into account detector efficiencies, angular and mom. coverage, decays, etc.

E00-108 Proposed Kinematics (I)

Running Time:

1-1.5 days for z-dependence (x-0.3)

5-6 days for x-dependence study

(only the 10.5^0 setting)

Total: 6 - 7.5 days

E00-108 Proposed Kinematics (II)

Running Time:

1-1.5 days for z-dependence (x-0.3)

9-10.5 days for x-dependence study

(only the 10.5^0 setting)

Total: 10-12 days