

# New Generation of Parton Distribution Functions with Uncertainty Analysis

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CTEQ6

Two advances

- treatment of experimental systematic errors
- a full uncertainty analysis

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hep-ph/0201195

## Related Work

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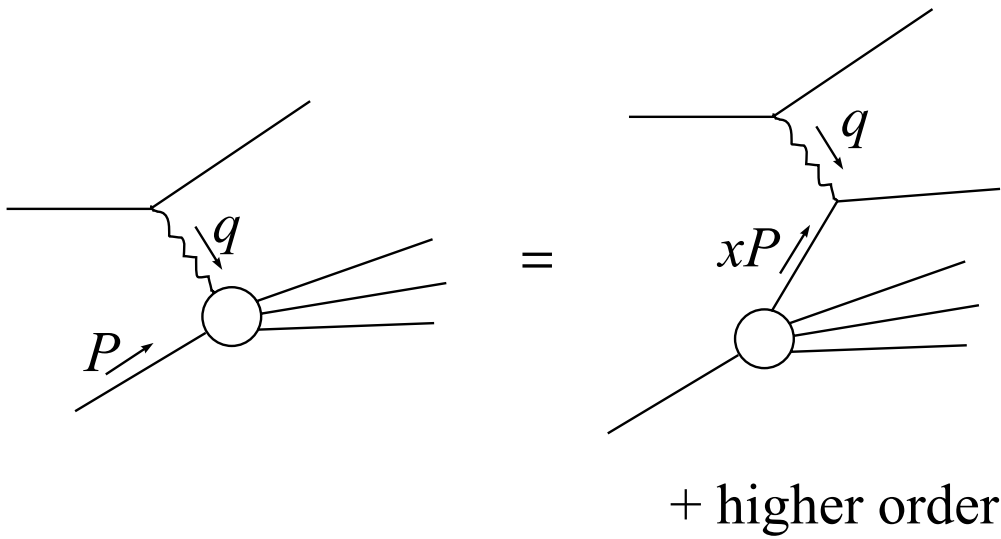
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## Parton Distribution Functions



Factorization theorem, schematically

$$\sigma(Q^2) = \sum_i \int_0^1 \hat{\sigma}_i(Q^2) f_i(x, Q^2) dx$$

Global analysis

- Parametrize  $f_i(x, Q_0^2; a_1 \dots a_n)$   
shape parameters
- NLO evolution in  $Q \implies f_i(x, Q^2)$
- The NLO parton cross sections ( $\hat{\sigma}_i$ ) are known.
- Find the “optimum” parameter values to fit data for many short-distance processes.

# Selection of Data

CTEQ5			CTEQ6		
	#	sys		#	sys
BCDMS $\mu p$	168	no	BCDMS $\mu p$	339	yes
BCDMS $\mu d$	156	no	BCDMS $\mu d$	251	yes
H1 $ep$	172	no	H1a $ep$	104	yes
			H1b $ep$	126	yes
ZEUS $ep$	186	no	ZEUS $ep$	229	yes
NMC $\mu p$	104	no	NMC $\mu p$	201	yes
NMC $\mu p/\mu n$	123	no	NMC $\mu p/\mu n$	123	yes
CCFR $F_2 \nu N$	87	no	CCFR $F_2 \nu N$	159	yes
CCFR $F_3 \nu N$	87	no	CCFR $F_3 \nu N$	87	no
E605 $pp$ DY	119	no	E605 $pp$	119	no
NA51 $pd/pp$ DY	1	no	NA51 $pd/pp$	1	no
E866 $pd/pp$ DY	15	no	E866 $pd/pp$	15	no
CDF W	11	no	CDF W	11	no
CDF jet	33	yes	CDF jet	33	yes
DØjet	24	yes	DØJet	90	yes