xFitter Examples & Applications

Case Study: The Strange Case of the Strange PDF

... can we solve it???

Fred Olness SMU

Thanks for substantial input
from my friends & colleagues

C T E Q

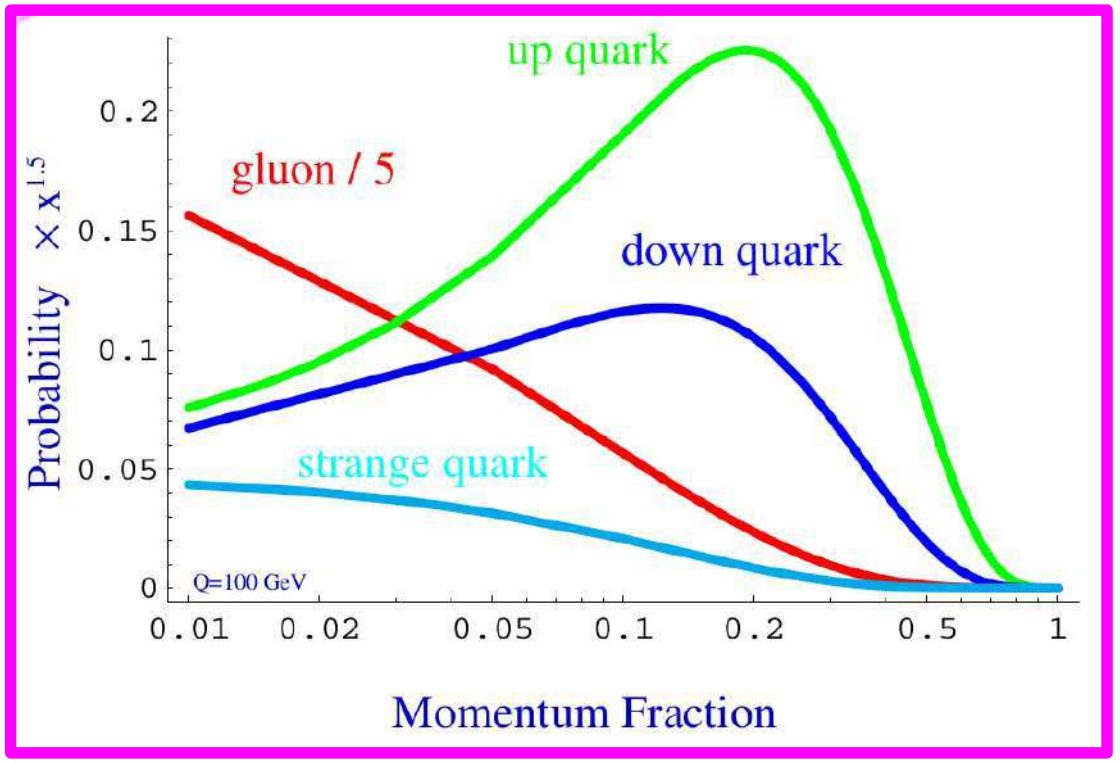
nCTEQ
nuclear parton distribution functions

xFitter

SURGE COLLABORATION

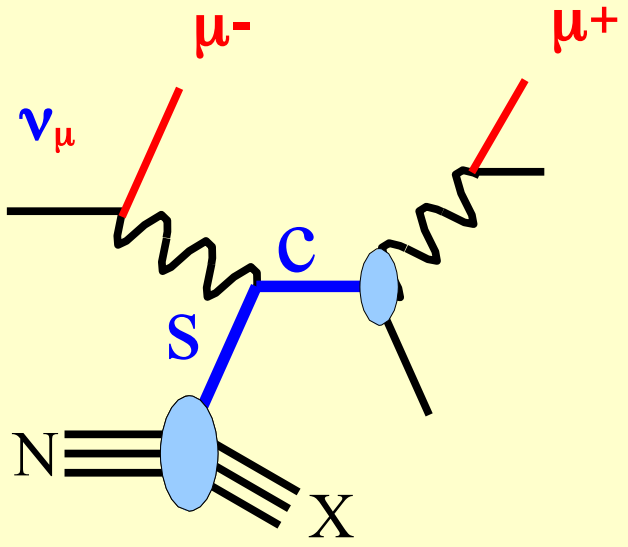
2026 CFNS
Stony Brook University
4 June 2026

Strange PDF: ν N di-muon Production

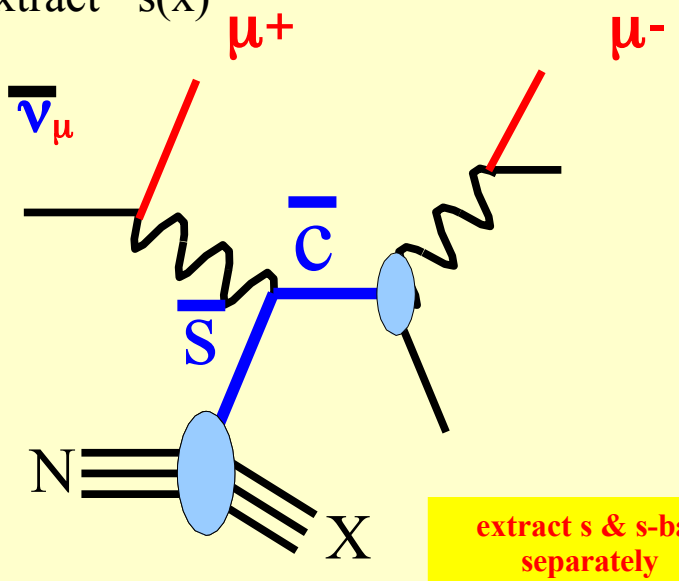


Need to "dig out" s(x) underneath d(x)

Extract s(x)

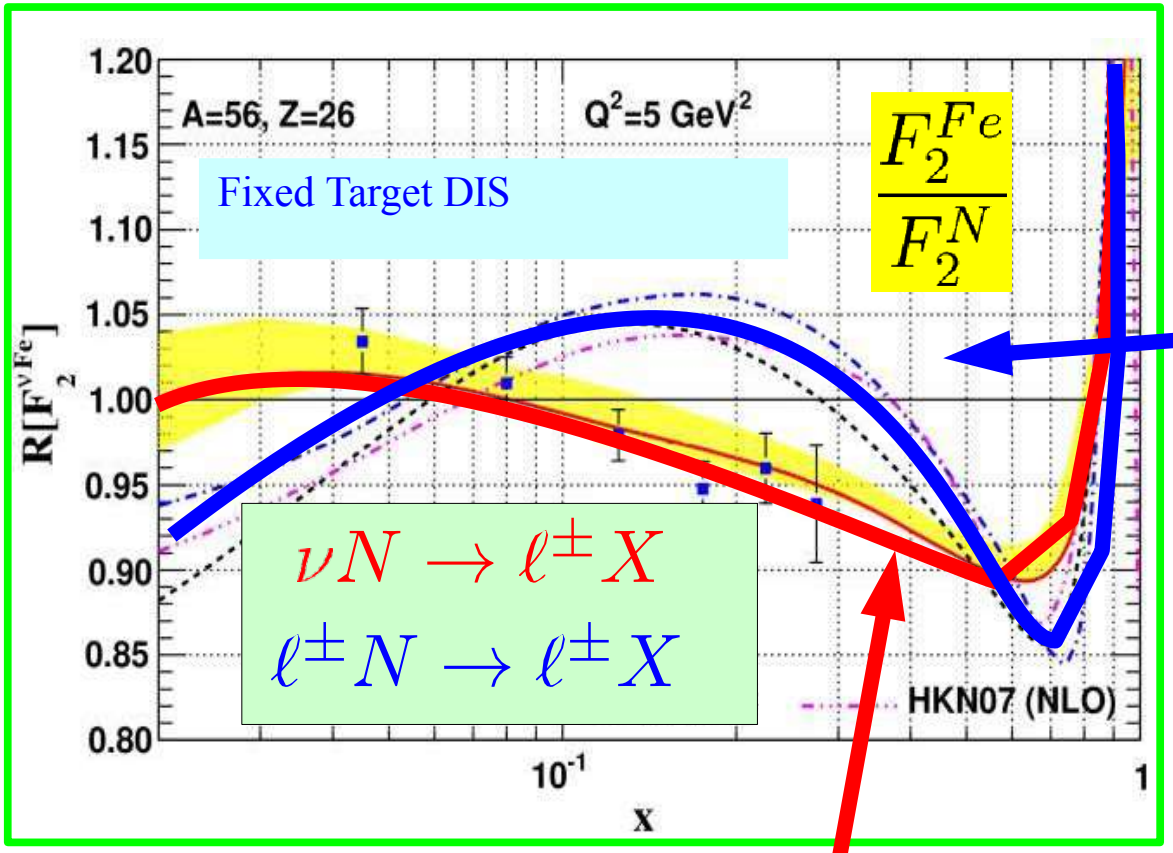


Extract $\bar{s}(x)$

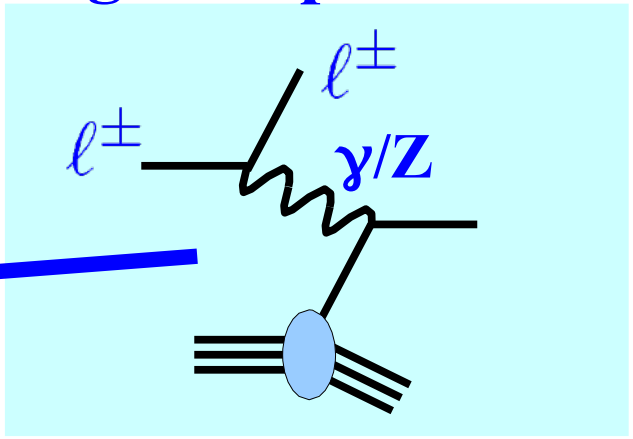


extract s & s-bar separately

SPLIT PERSONALITY: What is the Nuclear Correction

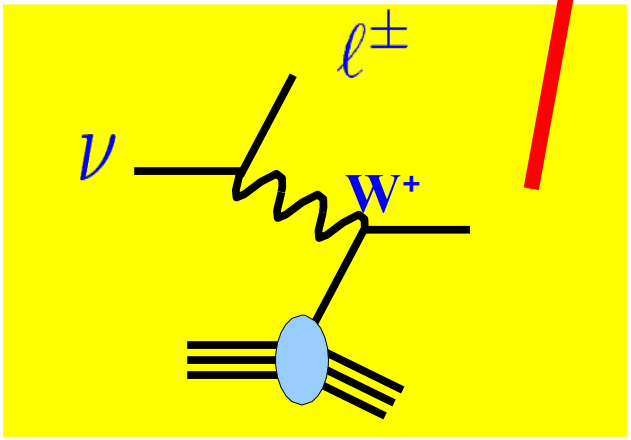


Charged Lepton DIS

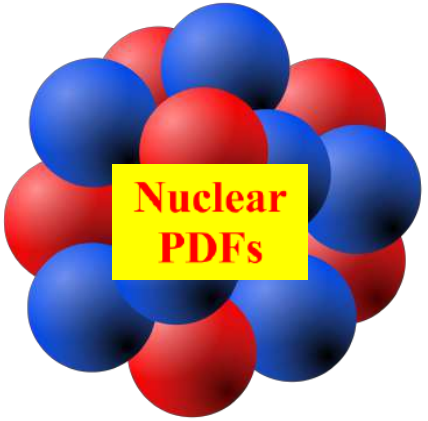


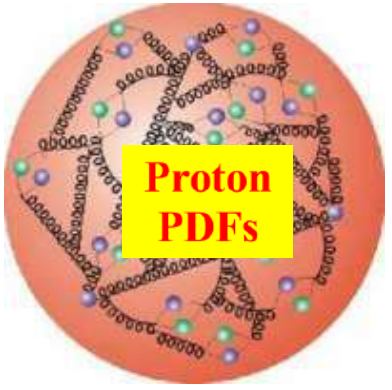
some caveats
... correlated errors

Depends on nuclear corrections



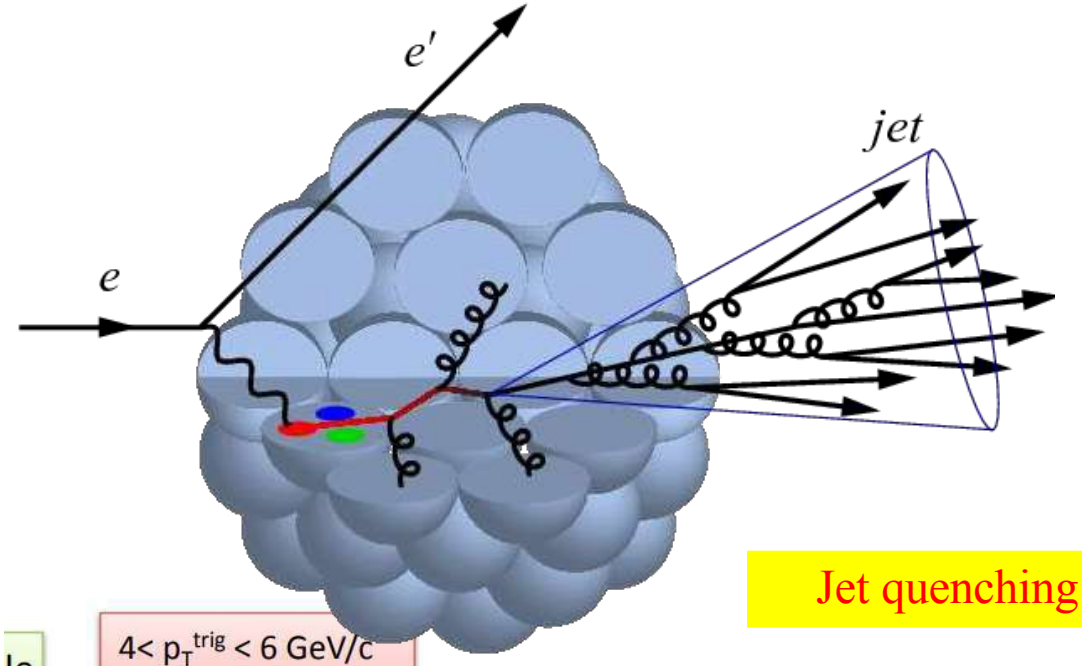
Neutrino DIS



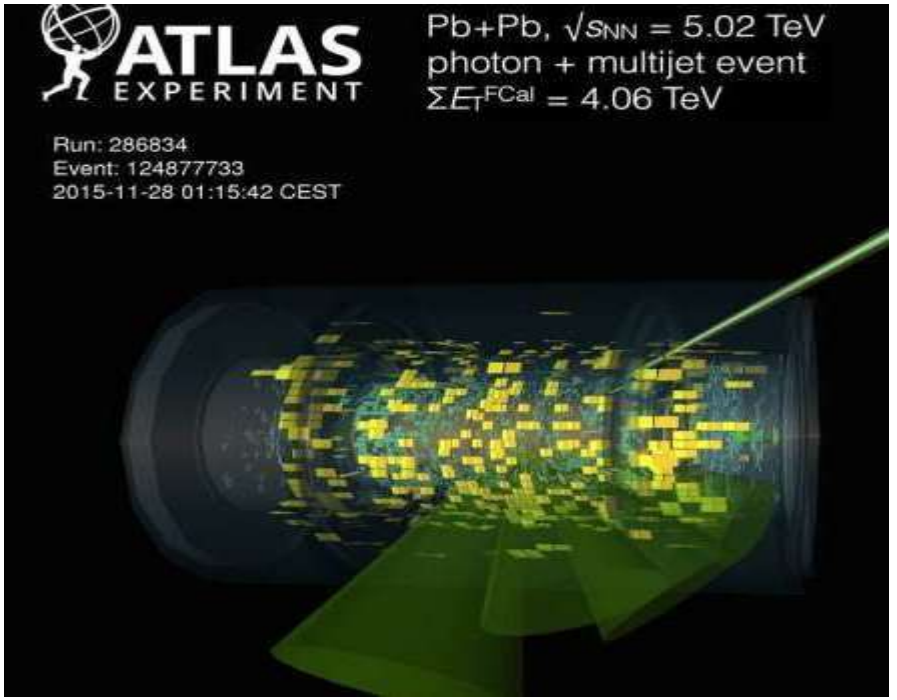


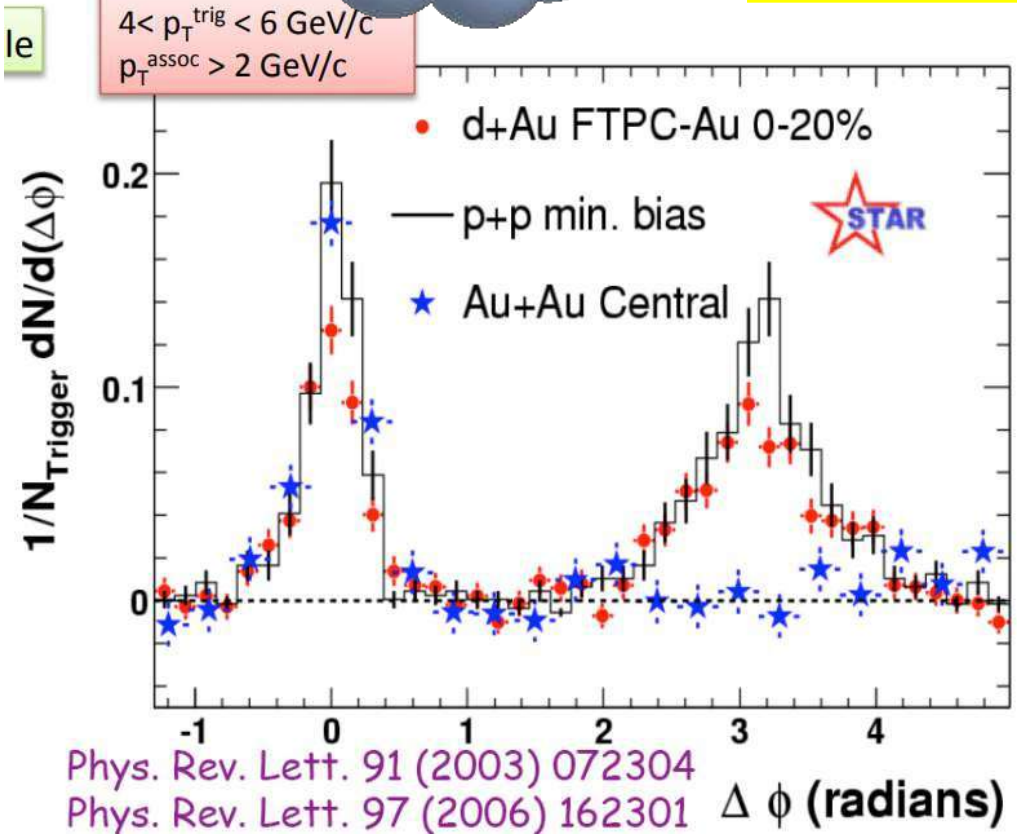
Propagation of ν/W thru nuclei

Propagation of v/W thru nuclei

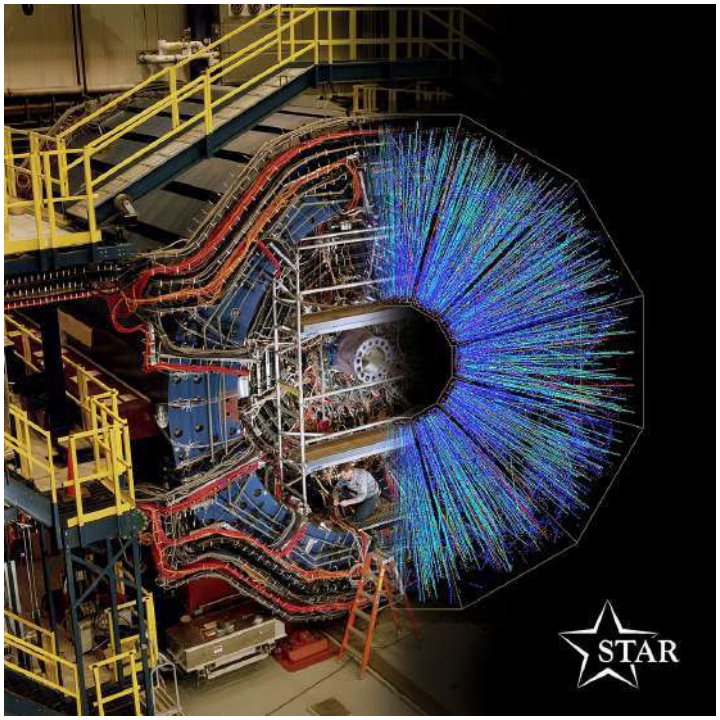


Jet quenching

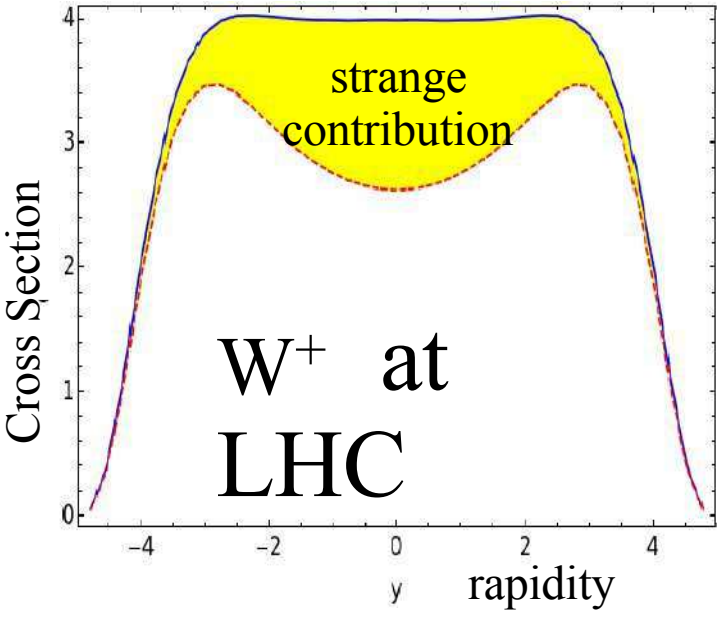


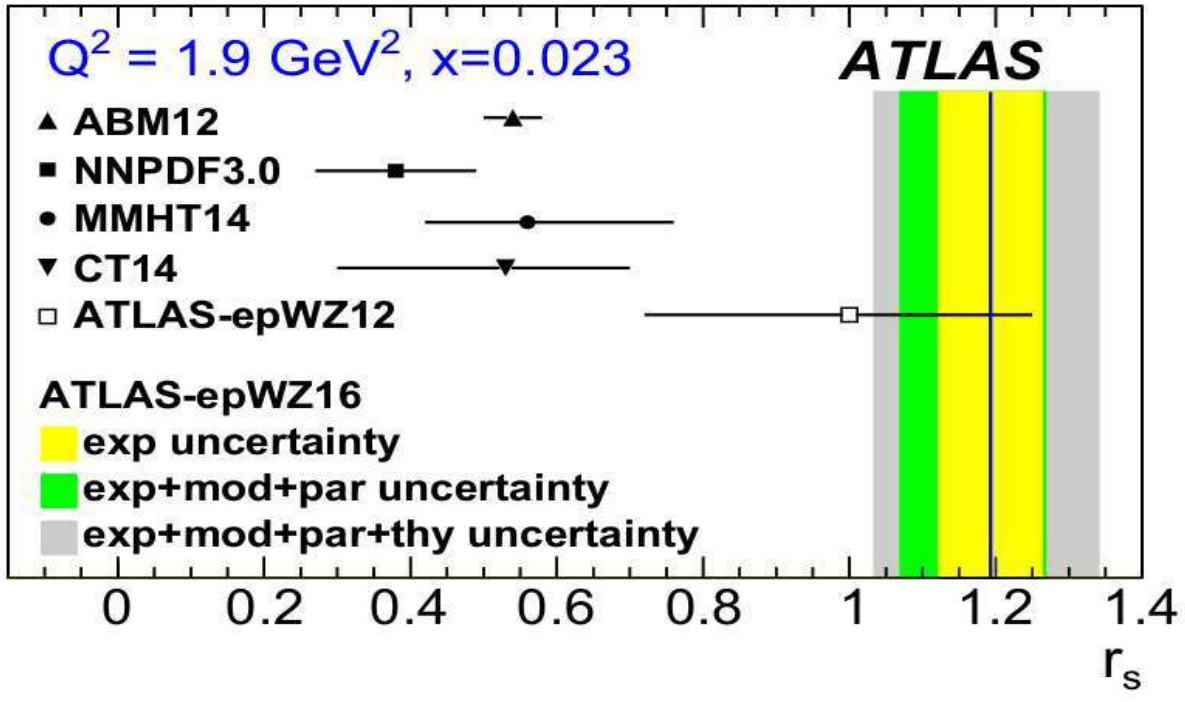


Phys. Rev. Lett. 91 (2003) 072304
Phys. Rev. Lett. 97 (2006) 162301



$$u\bar{d} + u\bar{s} + c\bar{d} + c\bar{s} \rightarrow W^+$$
$$\bar{u}d + \bar{u}s + \bar{c}d + \bar{c}s \rightarrow W^-$$
$$u\bar{u} + d\bar{d} + s\bar{s} + c\bar{c} \rightarrow Z$$





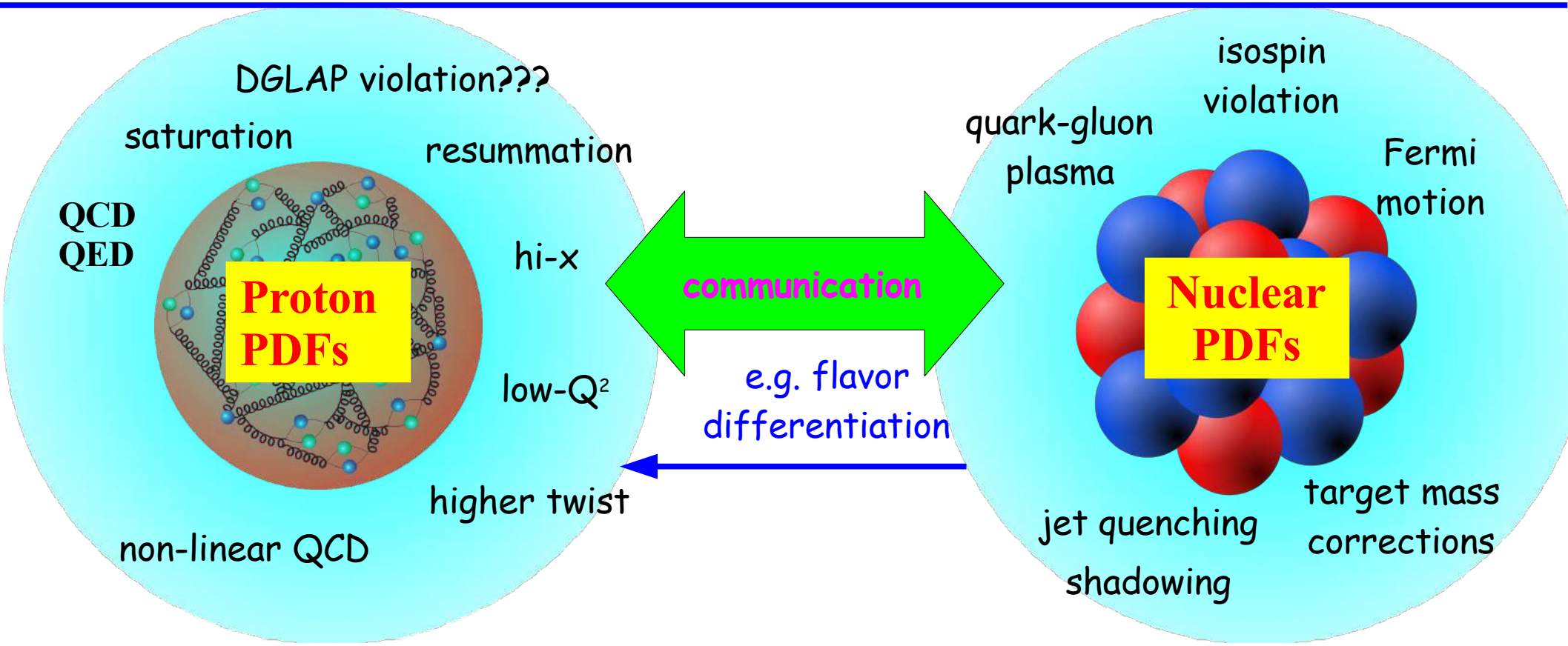
$$r^s = \frac{\bar{s} + s}{2\bar{d}}$$

Do it yourself!!!
Try **xFitter**

xFitter Tutorial

ATLAS: Eur. Phys. J. C 77 (2017) 367

… the motivation for nCTEQ



Data from nuclear targets play a key role in the flavor differentiation

nCTEQ

nuclear parton distribution functions