

QCD Phenomenology at High Energy

Bryan Webber

CERN Academic Training Lectures 2008

- **Basics of QCD**

- ❖ QCD Lagrangian
- ❖ Running coupling
- ❖ Renormalization schemes
- ❖ Asymptotic freedom
- ❖ Non-perturbative QCD

- **e^+e^- , NLO & Parton Branching**

- ❖ e^+e^- annihilation
- ❖ NLO QCD calculations
- ❖ Parton branching

- **DIS & Evolution Equations**

- ❖ Deep inelastic scattering
- ❖ DGLAP equation
- ❖ Parton showers
- ❖ Soft gluon coherence

- **Jet Fragmentation & Hadron-Hadron Processes**

- ❖ Jet fragmentation
- ❖ Hadronization models
- ❖ Hadron-hadron processes

- **Matching Fixed Order & Parton Showers**

- ❖ Matching to NLO
- ❖ Matching to LO multijets

See also:

1. *QCD and Collider Physics*, R.K. Ellis, W.J. Stirling & B.R. Webber [ESW] (Cambridge University Press, 1996); updates at <http://www.hep.phy.cam.ac.uk/theory/webber/QCDbook.html>
2. *Handbook of Perturbative QCD*, G. Sterman et al. (CTEQ Collaboration), Rev. Mod. Phys. 76, 157 (1995); updates at <http://www.phys.psu.edu/~cteq/>
3. *Introduction to Quantum Field Theory*, M.E. Peskin & D.E. Schroeder (Addison-Wesley, 1995); updates at <http://www.slac.stanford.edu/~mpeskin/QFT.html>
4. *Introductory Lectures on QCD*, B. Grinstein, in Proc. 2003 CERN-CLAF School, CERN Yellow Report 2006-001, <http://doc.cern.ch/yellowrep/2006/2006-001/>