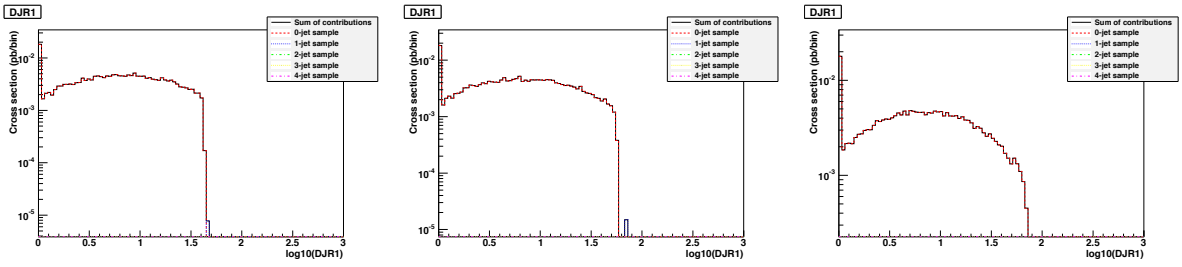
Double Higgs Production at e^-p collider

Abstract: To be included later.

Contents

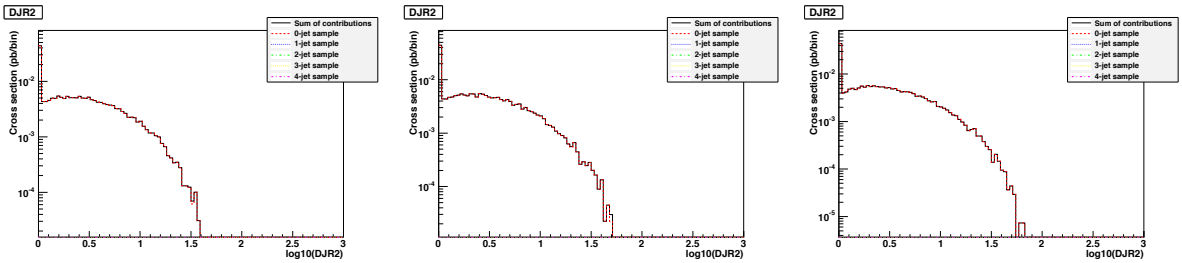
1 Jet-parton Matching for single and double higgs signals

In this section we studied jet-parton matching scenarios for single and souble higgs production through charged-current at e^-p collider. The processes we are looking for a) $e^-p \to \nu_e hj$ and b) $e^-p \to \nu_e hhj$ with 0, 1 and 2 jets, where p and j are 5-flavour. For these studies we consider $E_e = 60$ GeV, $E_p = 50$ TeV and $m_H = 125$ GeV and fixed the factorization and renormalization scale $\mu_F = \mu_R = m_H$. For matching, p_T ordered shower is used with MLM-k_T matching-scheme with different matching scales $xqcut/QCUT = max(xqcut + 5, xqcut * 1.2)$ and shown in the Figures below. Distributions are differnetial with arbitrary scale (not normalized).



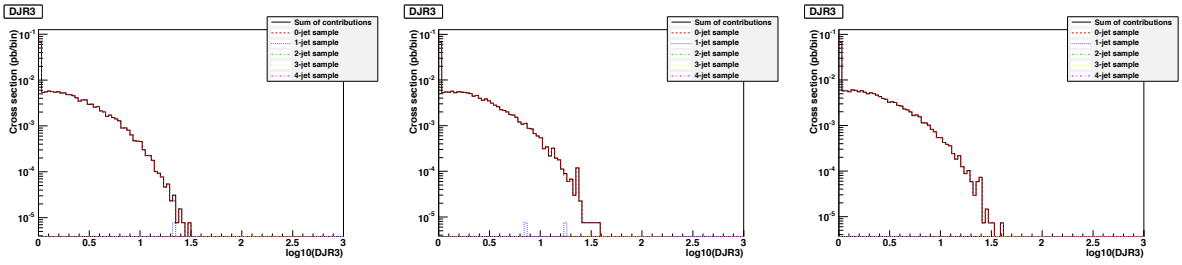
(a) (b) (c)

Figure 1: *Matching plots DJR1 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for single higgs production.*



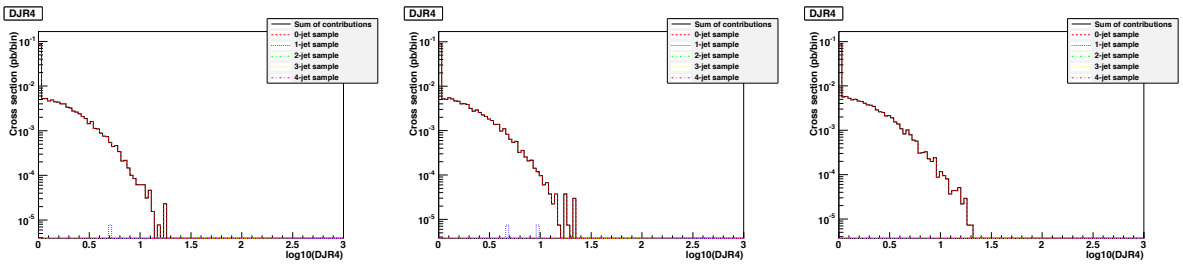
(a) (b) (c)

Figure 2: *Matching plots DJR2 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for single higgs production.*



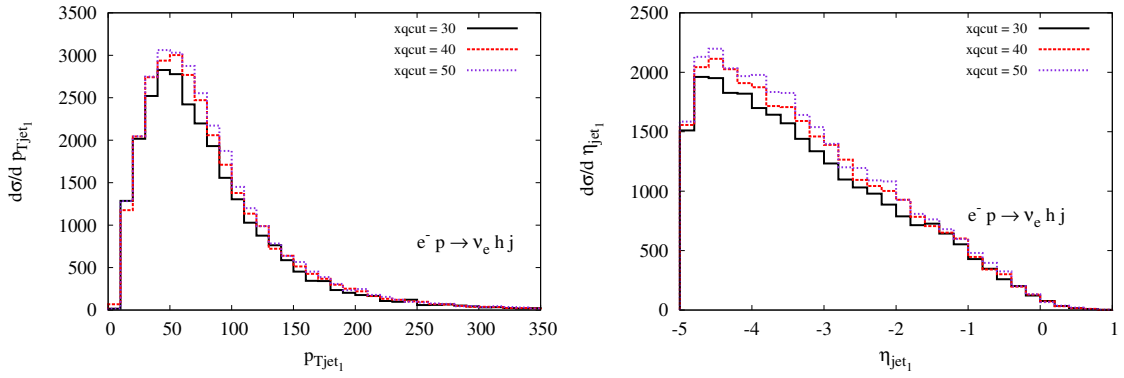
(a) (b) (c)

Figure 3: *Matching plots DJR3 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for single higgs production.*

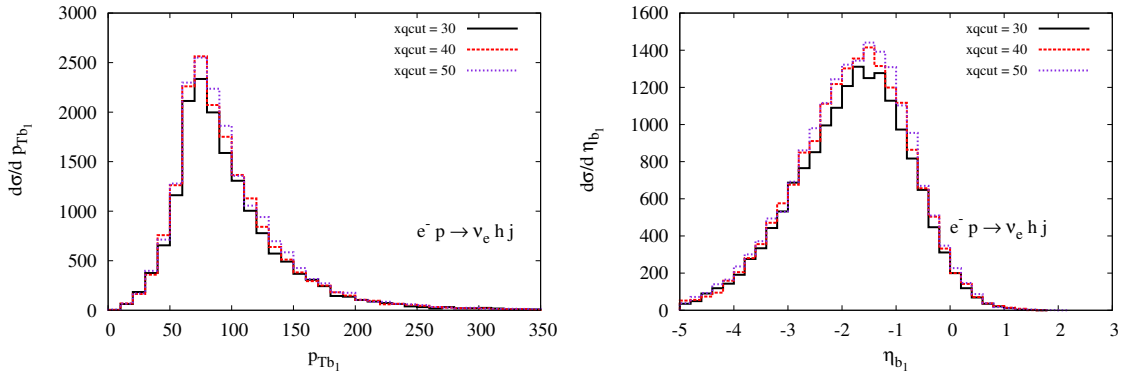


(a) (b) (c)

Figure 4: *Matching plots DJR4 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for single higgs production.*

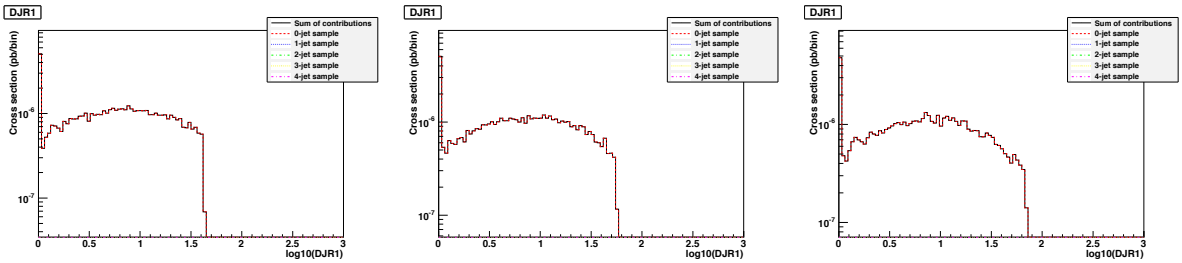


(a) (b)



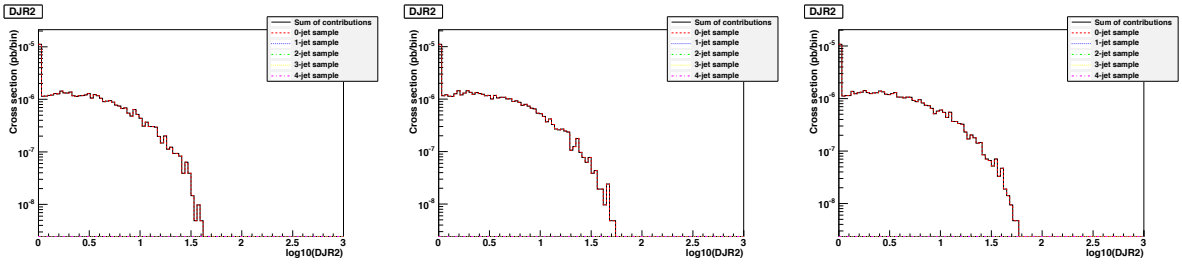
(c) (d)

Figure 5: *p_T and rapidity distributions of (a,b) forward jet and (c,d) highest-p_T b-jet (which comes through higgs decay) for single higgs production.*



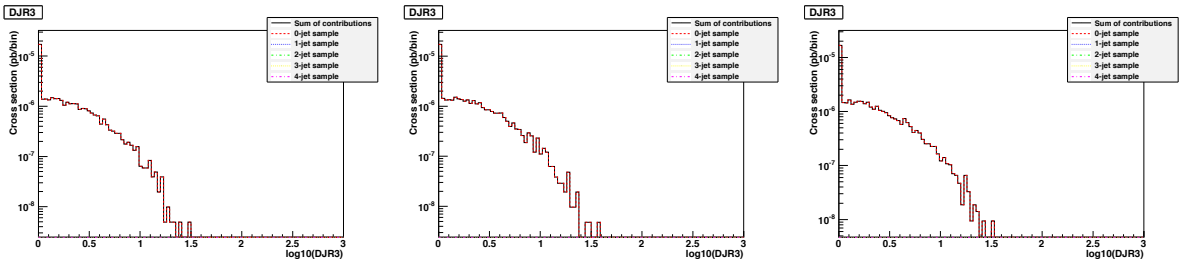
(a) (b) (c)

Figure 6: *Matching plots DJR1 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for double higgs production.*



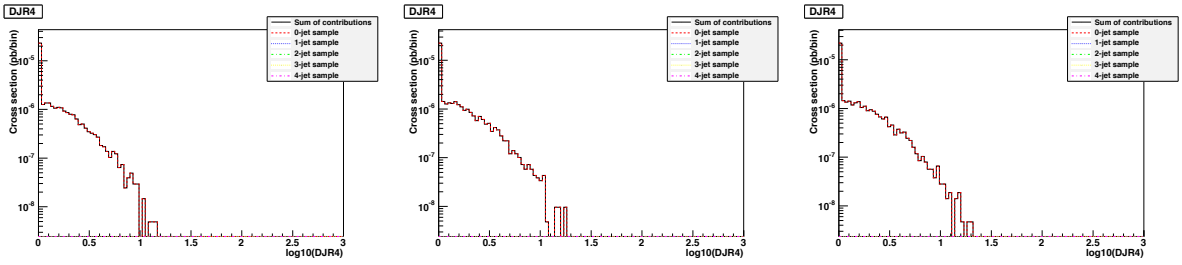
(a) (b) (c)

Figure 7: *Matching plots DJR2 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for double higgs production.*



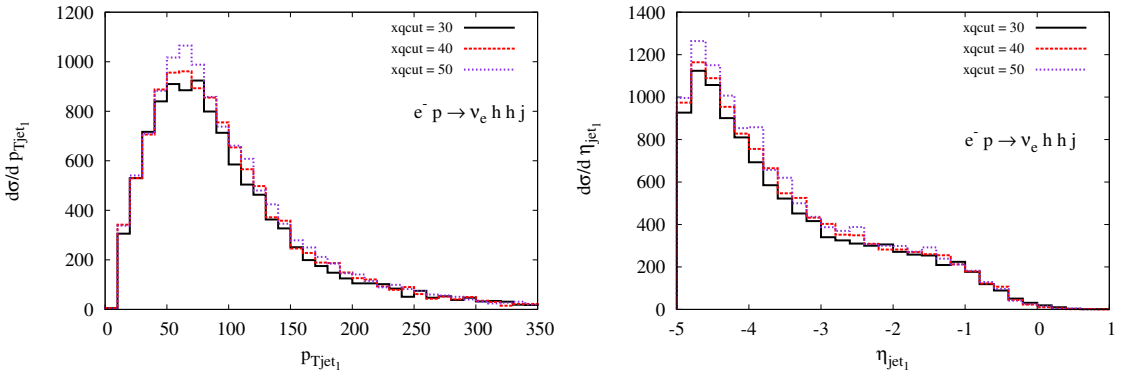
(a) (b) (c)

Figure 8: *Matching plots DJR3 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for double higgs production.*

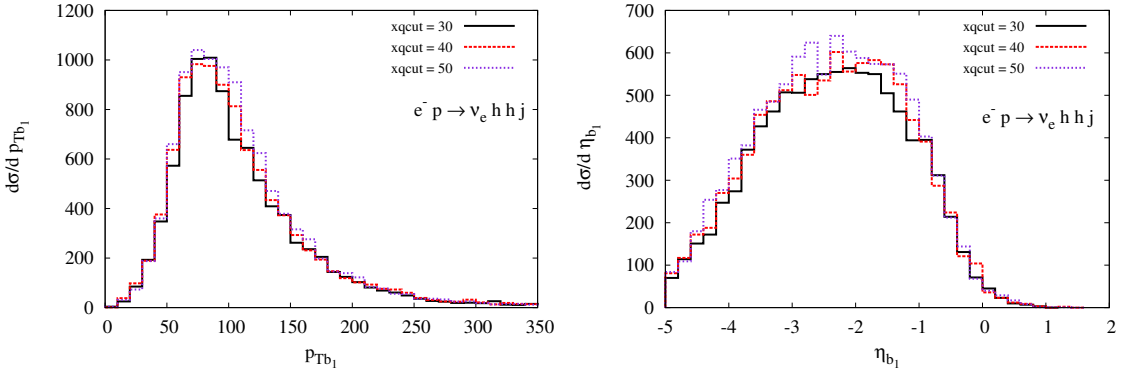


(a) (b) (c)

Figure 9: *Matching plots DJR4 for (a) xqcut* $= 30$*, (b) xqcut* $= 40$ *and (c) xqcut* $= 50$ *for double higgs production.*

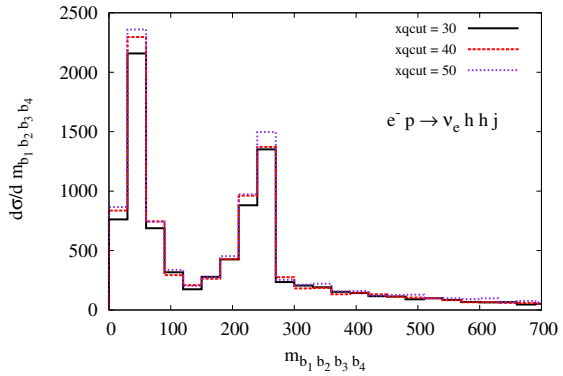


(a) (b)



(c) (d)

Figure 10: *p_T and rapidity distributions of (a,b) forward jet and (c,d) highest-p_T b-jet (which comes through higgs decay) for double higgs production.*



(a)

Figure 11: *Invariant mass distribution of 4-b jets (from higgs decay) for double higgs production.*