March 29, 2006

Exclusive HLT Selection Criteria Plots

Luis Fernández[1]
LPHE, EPFL

Patrick Koppenburg[2]
CERN

Abstract

We give here all the distributions used in the determination of the selection criteria for each of the HLT selections, as presented in [1].

[1] Luis.Fernandez@epfl.ch
[2] Patrick.Koppenburg@cern.ch

Contents

1 Selection criteria distributions

We give the distributions for all the HLT selection criteria after the generic HLT for signal and minimum bias. The definition of the cuts and their values can be found in [1].

For the study of the selection criteria two kind of plots are produced::

- Distribution of the variable under study for all different candidates selected by the final off-line selection (blue, dotted line) versus the candidates selected by the specific HLT selection when applying no cuts at all (red, solid line). The selections are run on signal events, after the off-line selection and the generic HLT trigger. Only the particles entering a fully associated candidate with respect to the true Monte Carlo decay are drawn and the histograms are not normalized. The vertical line (green, dashed) and the arrow represent the HLT selection cut.

- Distribution of the variable under study for all different candidates selected by the specific HLT selection when applying preselection cuts to reduce combinatorics. The preselected and associated candidates in the signal sample (red, solid line) and after the off-line selection and generic HLT trigger are drawn versus all the preselected candidates in the minimum-bias after the generic HLT (blue, dotted line). The full distributions are normalized to unity.[3] The vertical line (green, dashed) and the arrow represent the HLT selection cut.

Note that the under/overflows are drawn in the first/last bins only whenever it is relevant to the selection cut.

[3] In the plots A.N. stands for arbitrary units.

1.1 $B_s \to D_s h$ plots

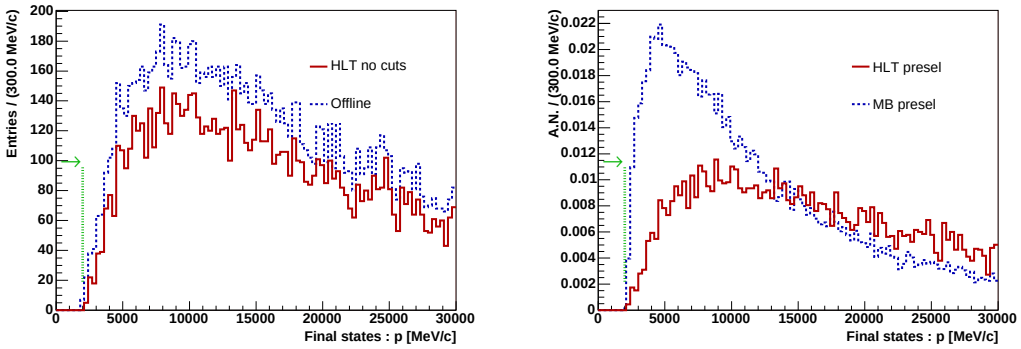

Figure 1: $B_s \to D_s h$, momentum p of D_s products [MeV/c].

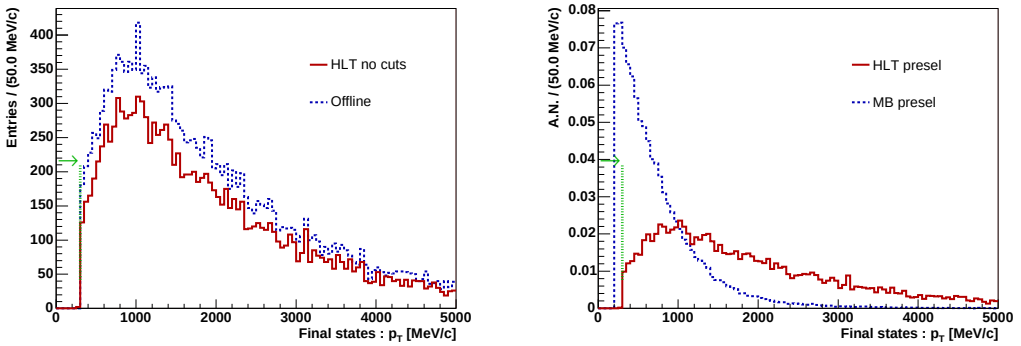

Figure 2: $B_s \to D_s h$, transverse momentum p_T of D_s products [MeV/c].

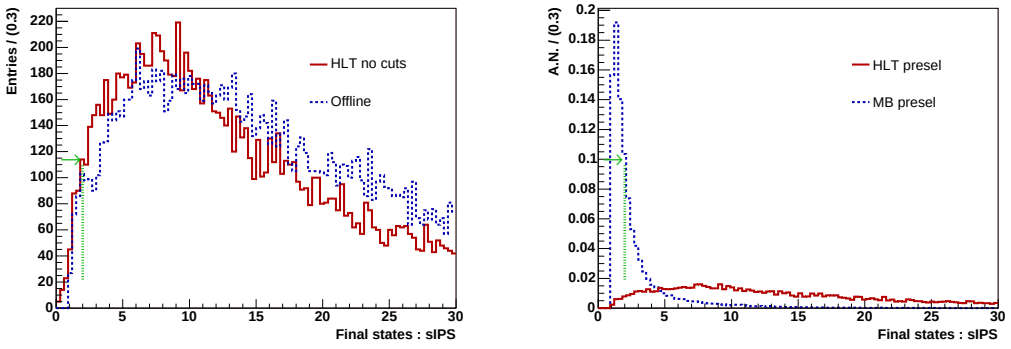

Figure 3: $B_s \to D_s h$, smallest impact paratemeter significance sIPS of D_s products.

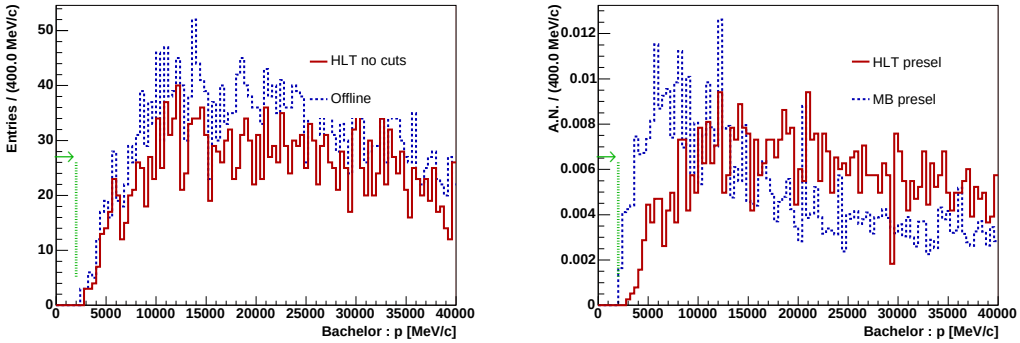

Figure 4: $B_s \to D_s h$, momentum p of bachelor [MeV/c].

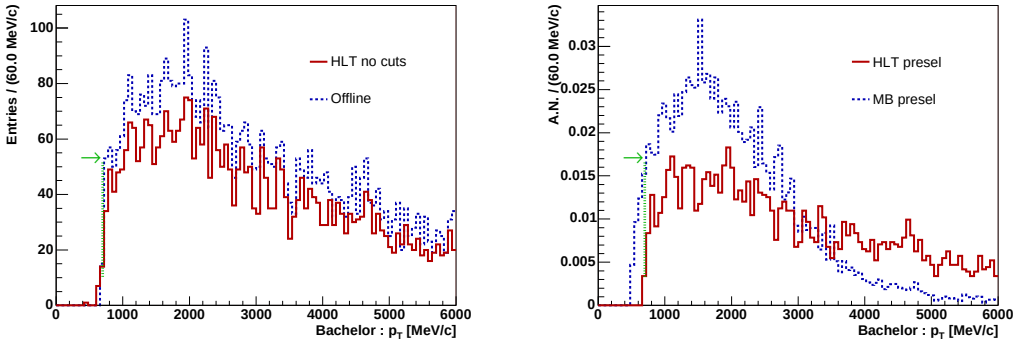

Figure 5: $B_s \to D_s h$, transverse momentum p_T of bachelor [MeV/c].

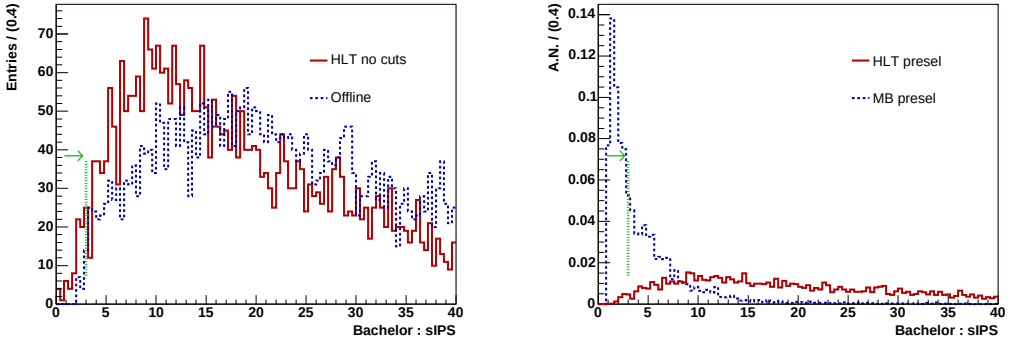

Figure 6: $B_s \to D_s h$, smallest impact paratemeter significance sIPS of bachelor.

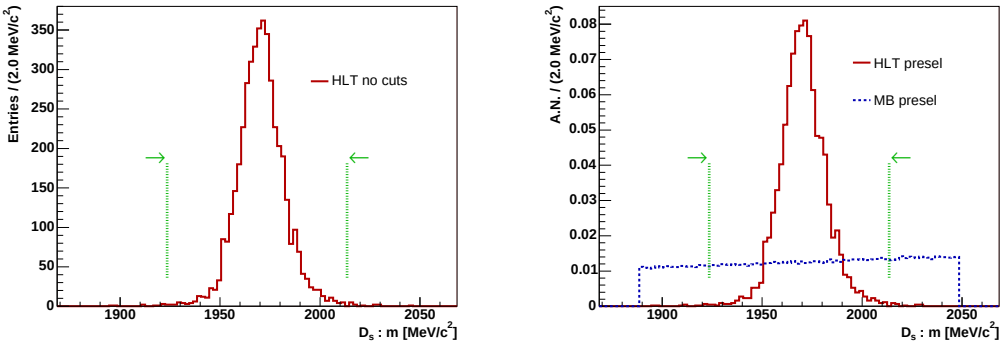

Figure 7: $B_s \rightarrow D_s h$, invariant mass m of D_s [MeV/c^2].

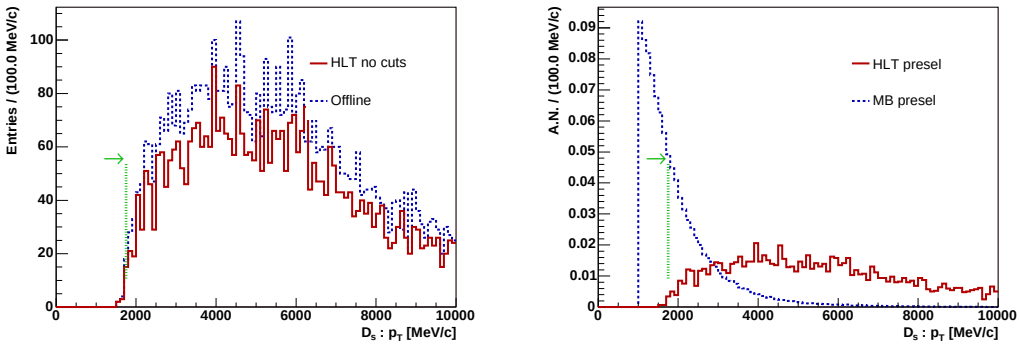

Figure 8: $B_s \rightarrow D_s h$, transverse momentum p_T of D_s [MeV/c].

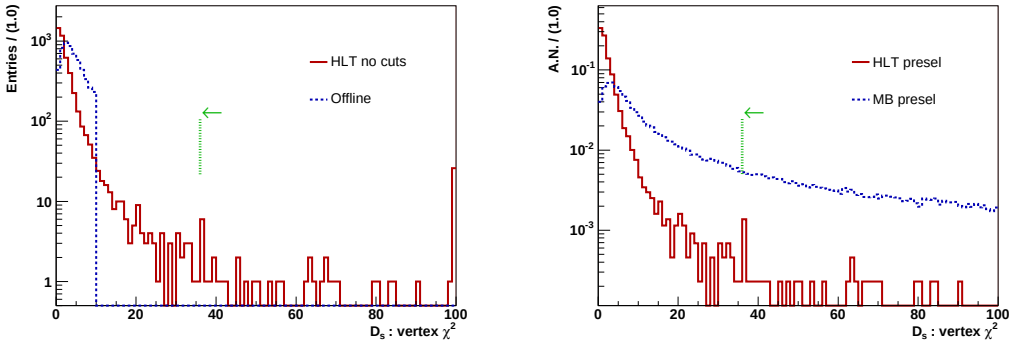

Figure 9: $B_s \rightarrow D_s h$, χ^2 of D_s vertex.

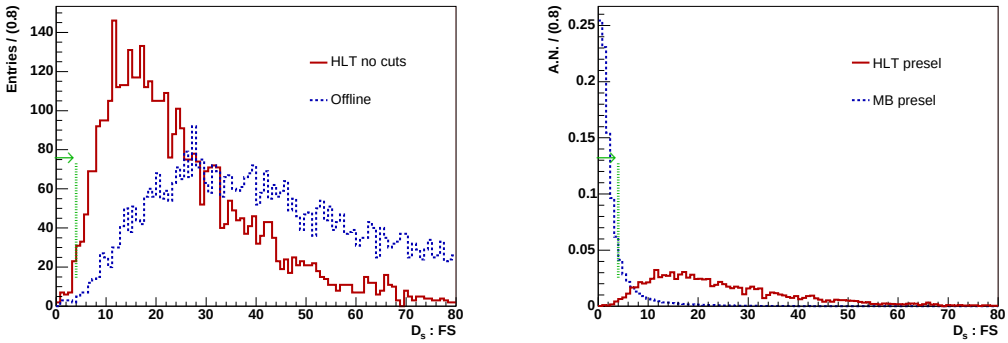

Figure 10: $B_s \rightarrow D_s h$, flight distance significance FS of D_s

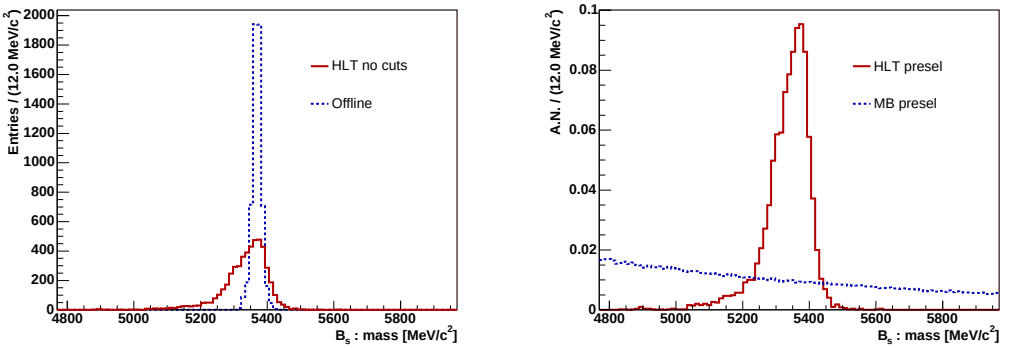

Figure 11: $B_s \rightarrow D_s h$, invariant mass m of B_s [MeV/c^2].

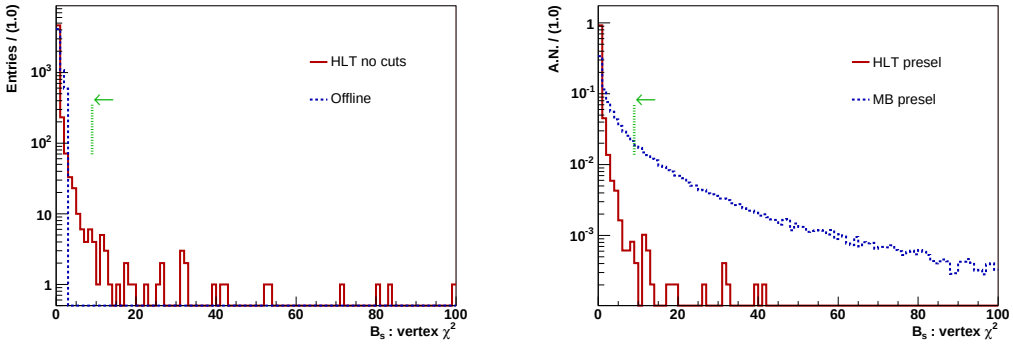

Figure 12: $B_s \rightarrow D_s h$, χ^2 of B_s vertex.

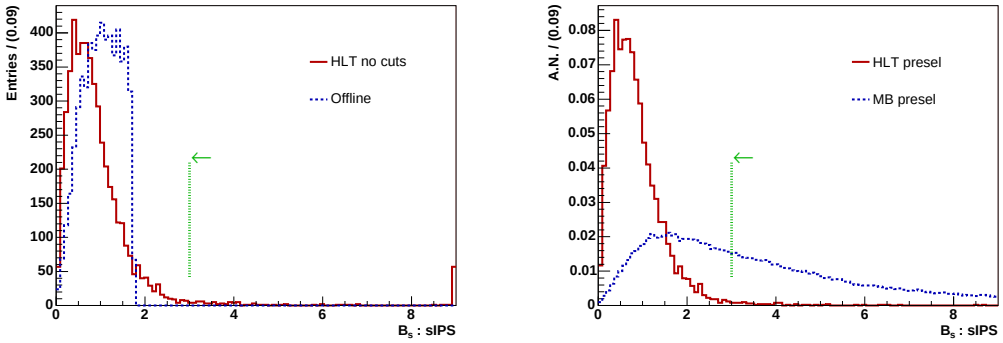

Figure 13: $B_s \to D_s h$, smallest impact paratemeter significance sIPS of B_s.

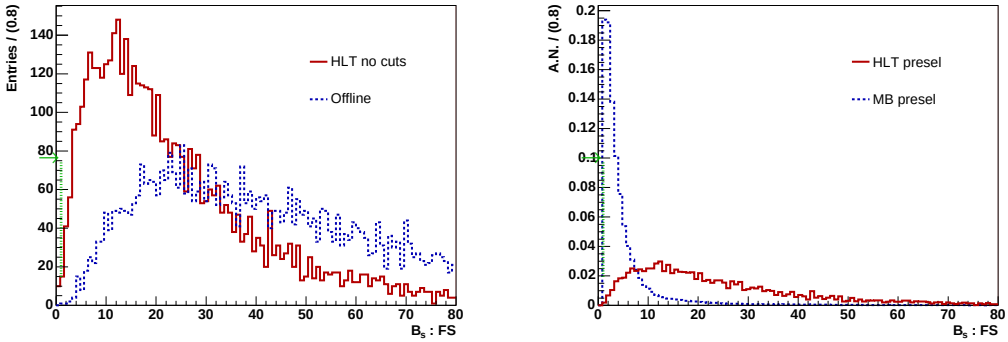

Figure 14: $B_s \to D_s h$, flight distance significance FS of B_s.

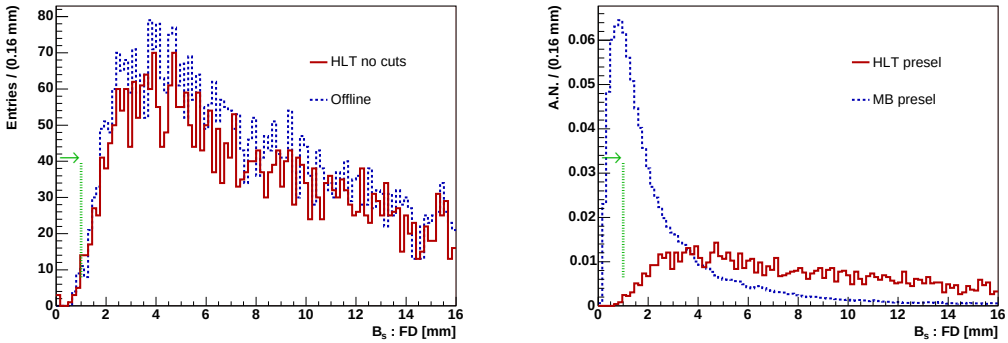

Figure 15: $B_s \to D_s h$, flight distance FD of B_s [mm].

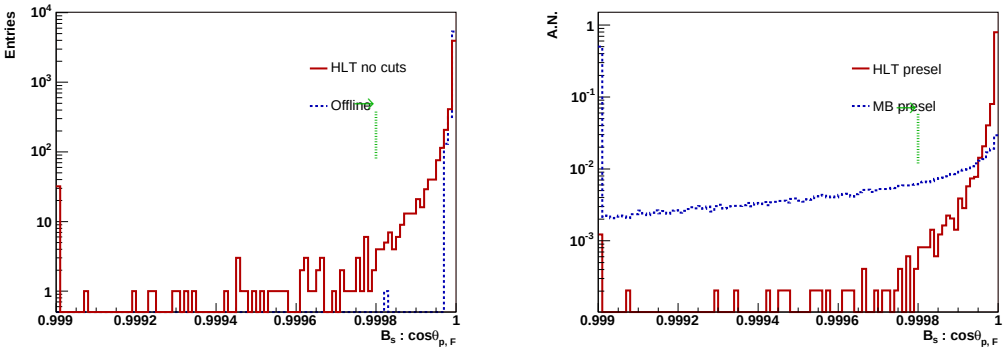

Figure 16: $B_s \rightarrow D_s h$, cosine of pointing angle $\cos\theta_{p,F}$ of B_s.

1.2 $B_q \to J/\psi X$ plots

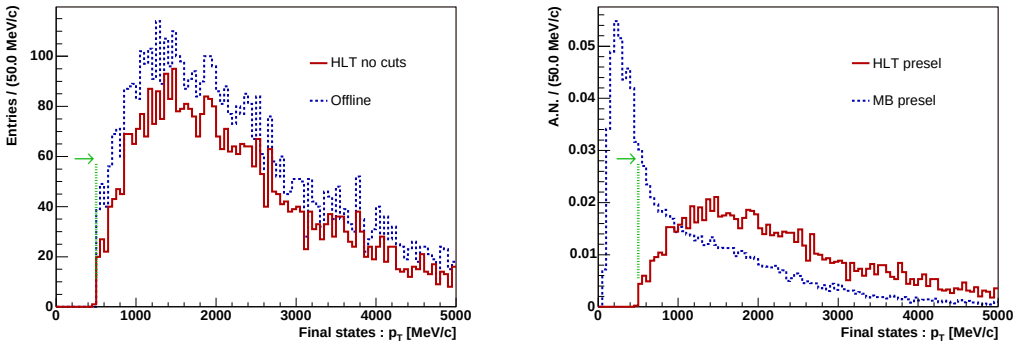

Figure 17: $B_q \rightarrow J/\psi X$, transverse momentum p_T of J/ψ products [MeV/c].

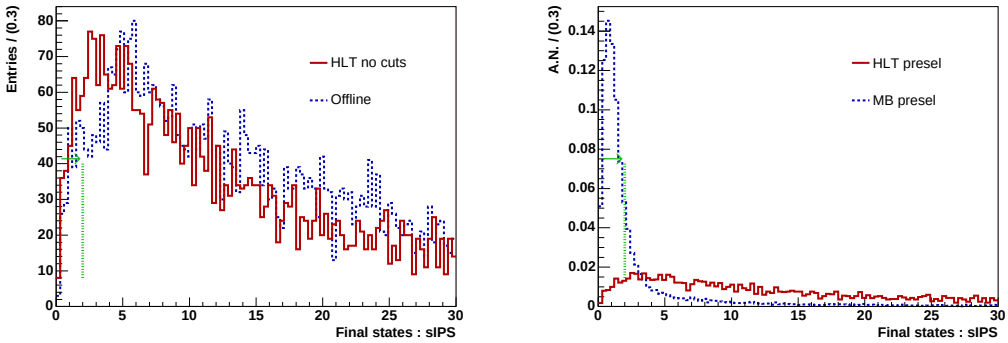

Figure 18: $B_q \rightarrow J/\psi X$, smallest impact paratemeter significance sIPS of J/ψ products.

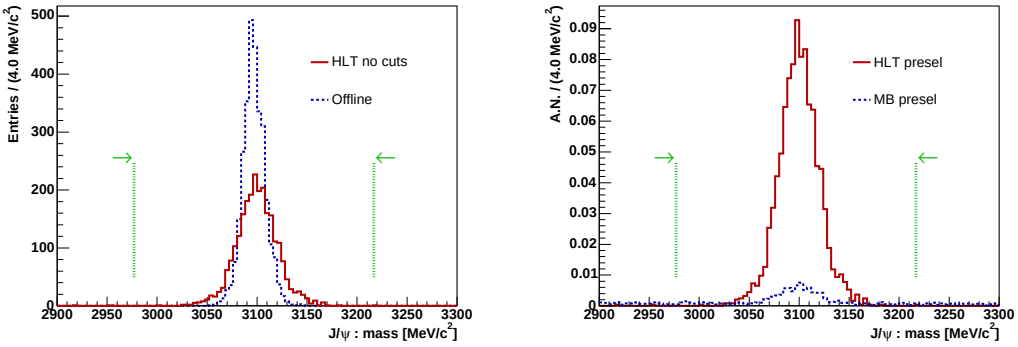

Figure 19: $B_q \rightarrow J/\psi X$, invariant mass m of J/ψ [MeV/c^2].

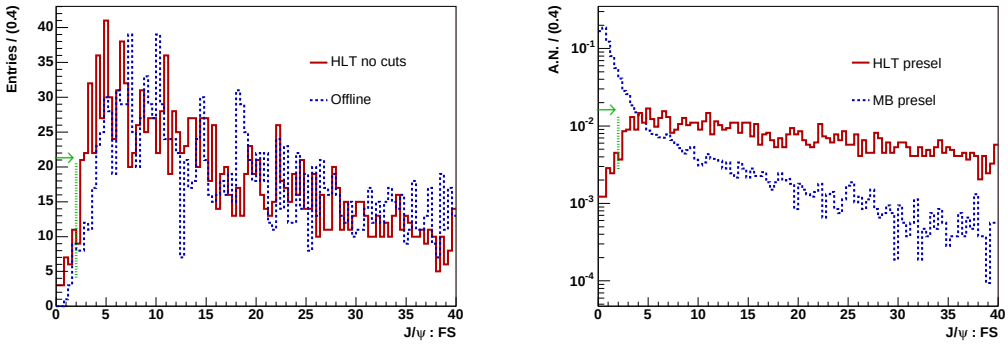

Figure 20: $B_q \to J/\psi X$, flight distance significance FS of J/ψ.

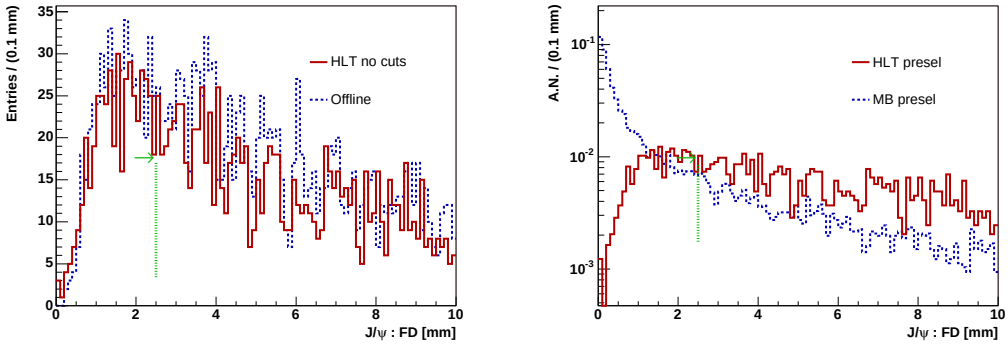

Figure 21: $B_q \to J/\psi X$, flight distance FD of J/ψ [mm].

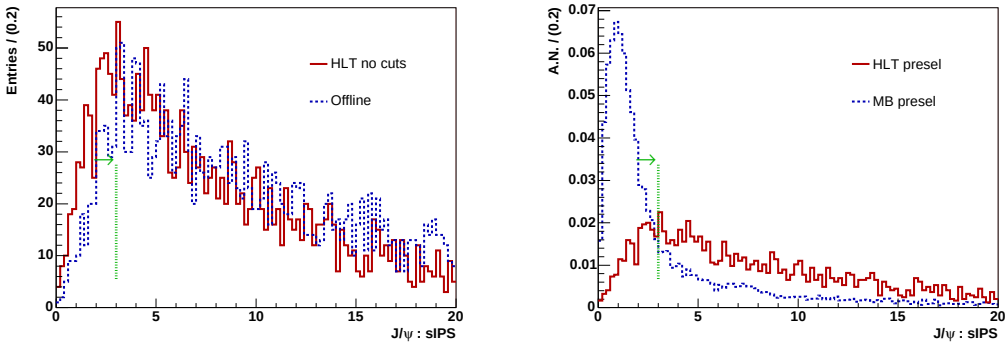

Figure 22: $B_q \to J/\psi X$, smallest impact paratemeter significance sIPS of J/ψ.

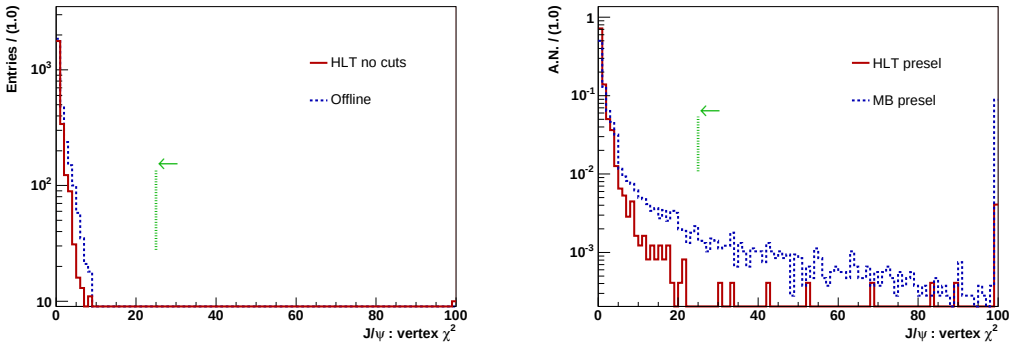

Figure 23: $B_q \rightarrow J/\psi X$, χ^2 of J/ψ vertex.

1.3 $B_q \to hh$ plots

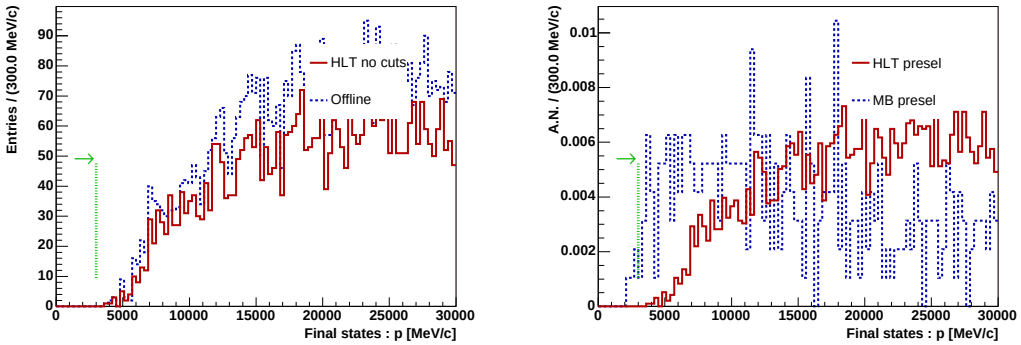

Figure 24: $B_q \to hh$, momentum p of B_q products [MeV/c].

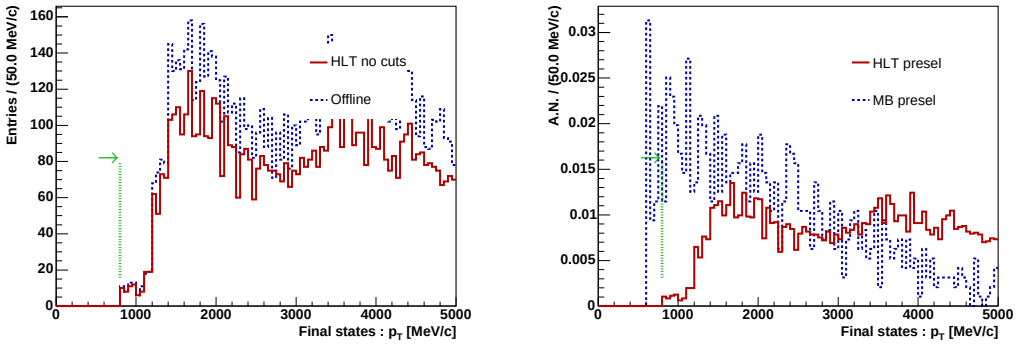

Figure 25: $B_q \to hh$, transverse momentum p_T of B_q products [MeV/c].

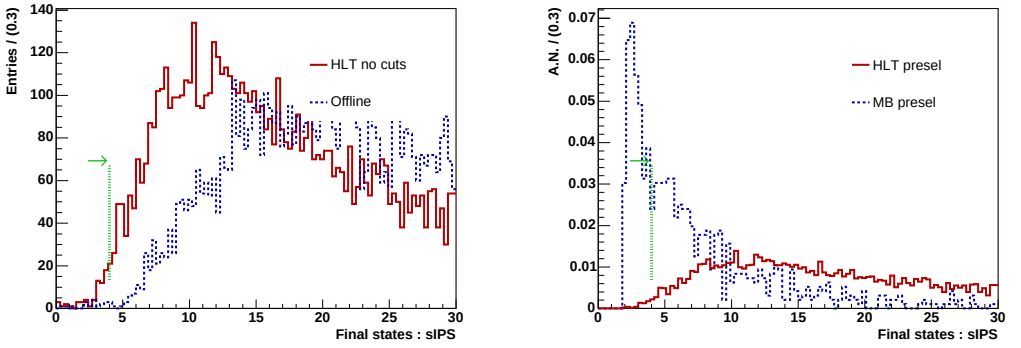

Figure 26: $B_q \to hh$, smallest impact paratemeter significance sIPS of B_q products.

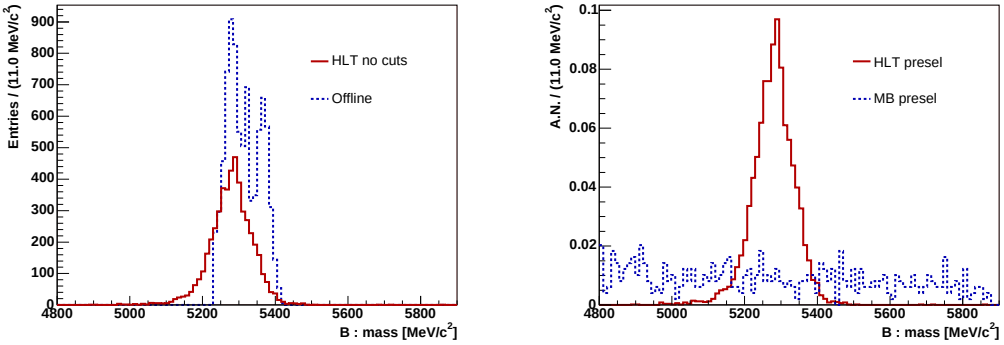

Figure 27: $B_q \to hh$, invariant mass m of B_q [MeV/c^2].

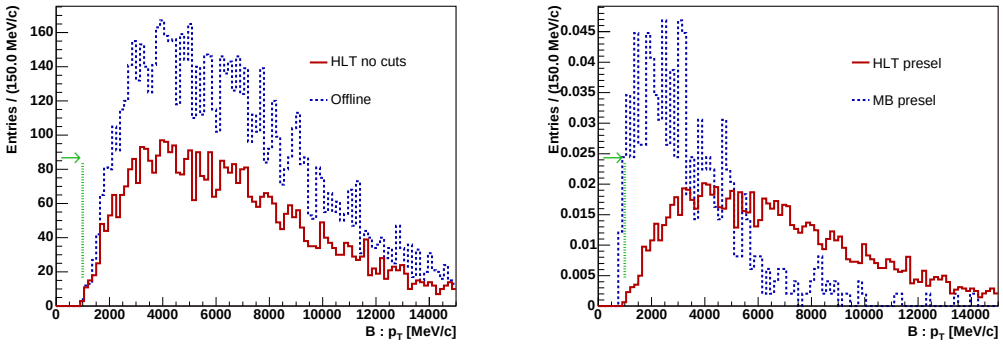

Figure 28: $B_q \to hh$, transverse momentum p_T of B_q [MeV/c].

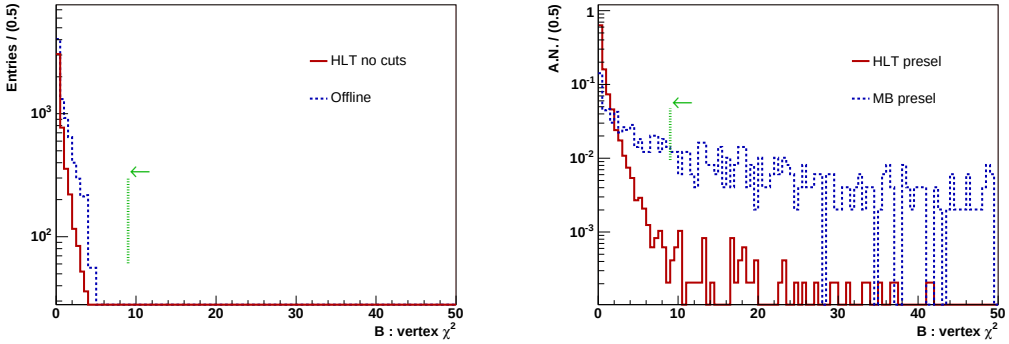

Figure 29: $B_q \to hh$, χ^2 of B_q vertex.

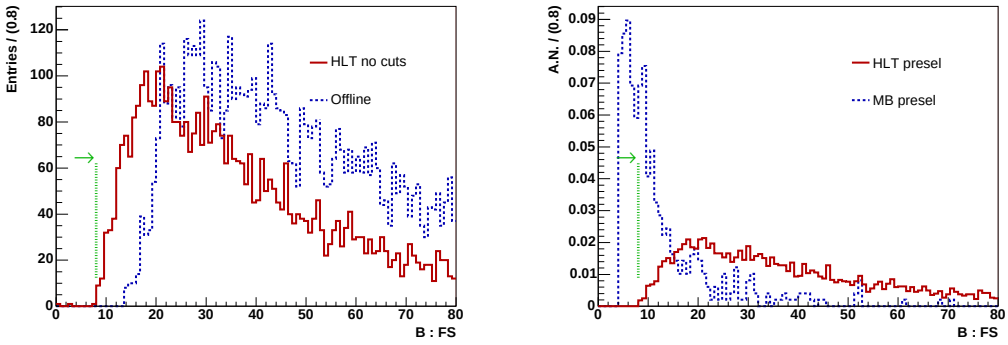

Figure 30: $B_q \to hh$, flight distance significance FS of B_q.

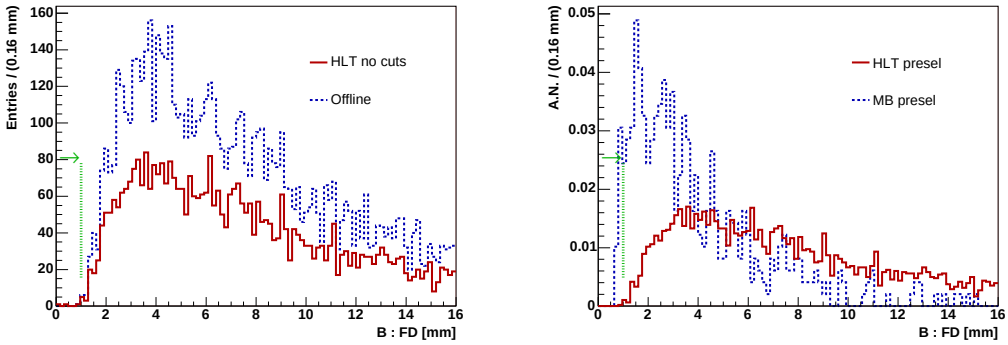

Figure 31: $B_q \to hh$, flight distance FD of B_q [mm].

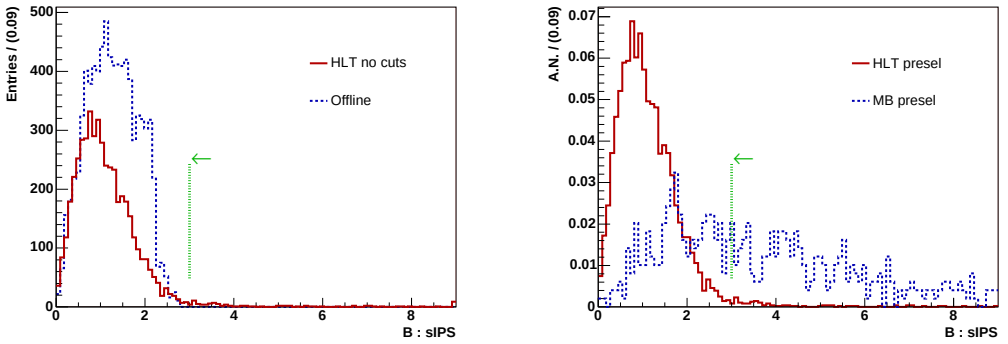

Figure 32: $B_q \to hh$, smallest impact paratemeter significance sIPS of B_q.

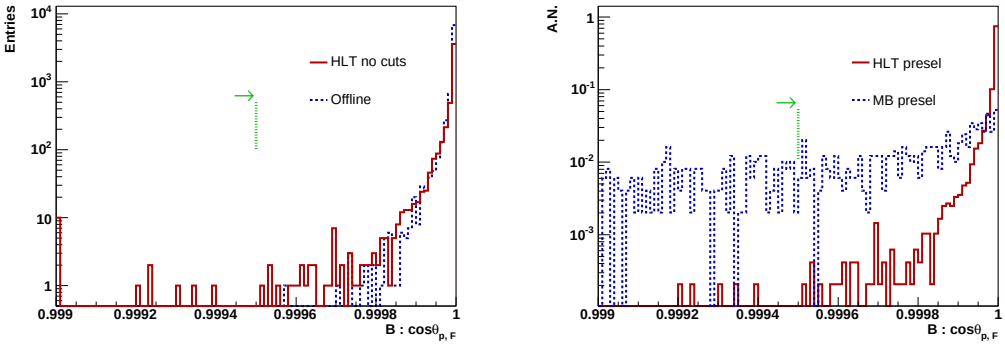

Figure 33: $B_q \to hh$, cosine of pointing angle $\cos\theta_{p,F}$ of B_q.

1.4 $B_d \to D^0 K^{*0}$ plots

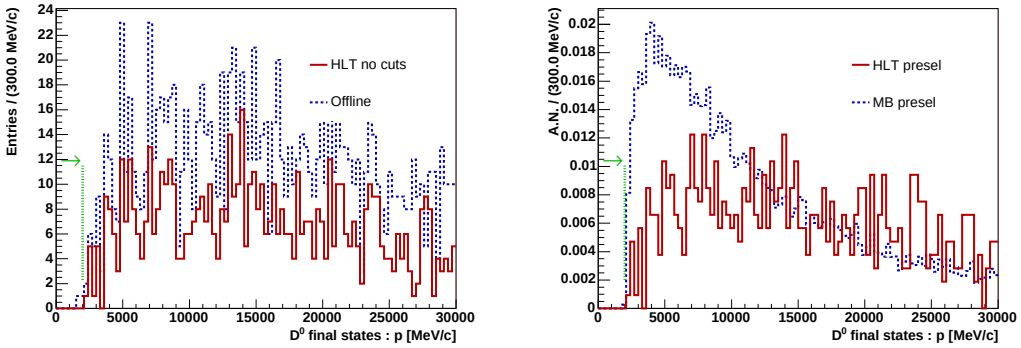

Figure 34: $B_d \to D^0 K^{*0}$, momentum p of D^0 products [MeV/c].

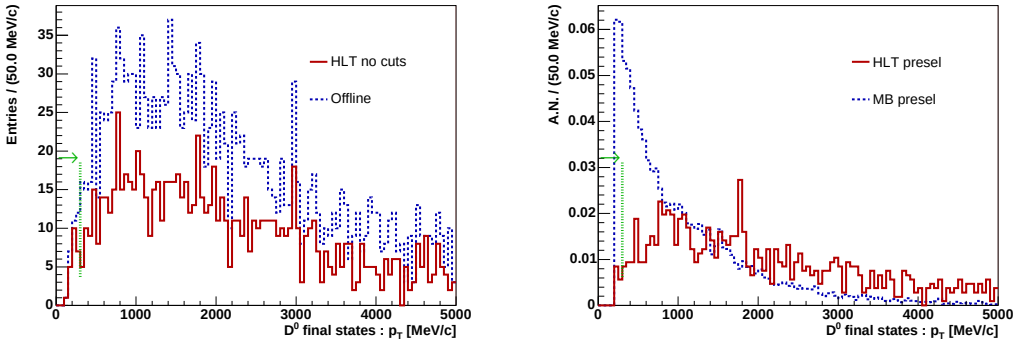

Figure 35: $B_d \to D^0 K^{*0}$, transverse momentum p_T of D^0 products [MeV/c].

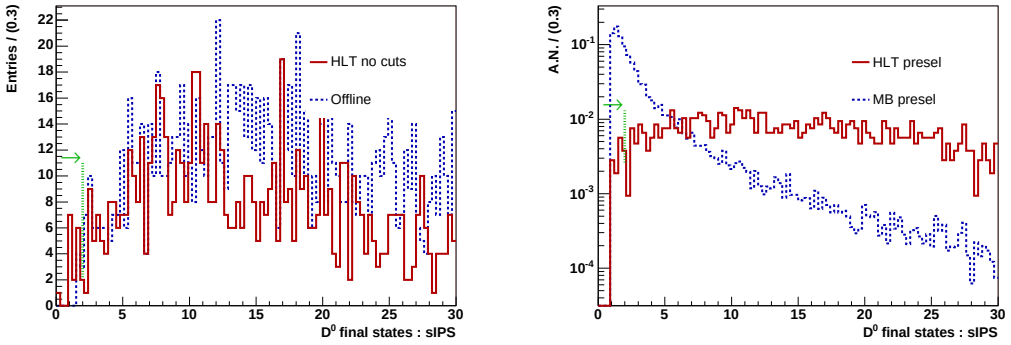

Figure 36: $B_d \to D^0 K^{*0}$, smallest impact paratemeter significance sIPS of D^0 products.

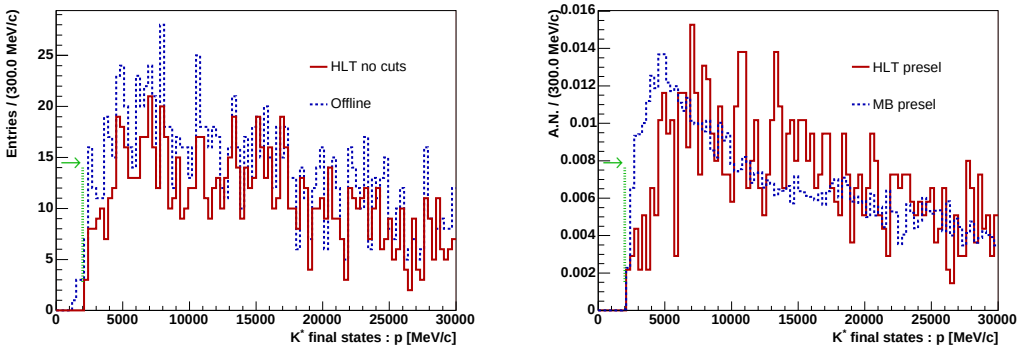

Figure 37: $B_d \to D^0 K^{*0}$, momentum p of K^{*0} products [MeV/c].

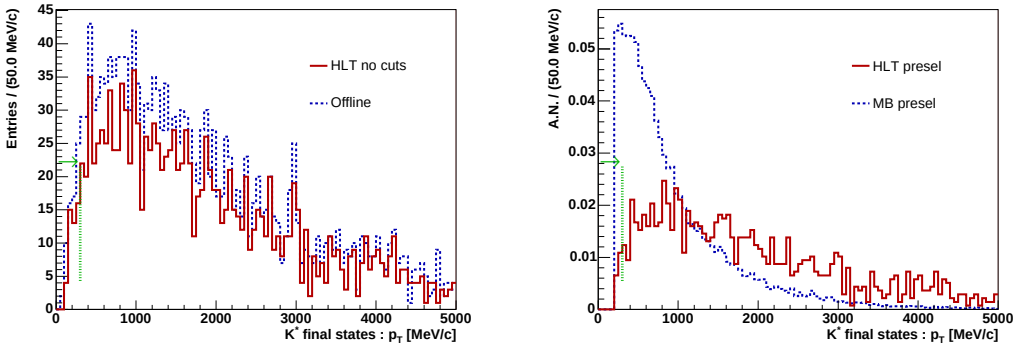

Figure 38: $B_d \to D^0 K^{*0}$, transverse momentum p_T of K^{*0} products [MeV/c].

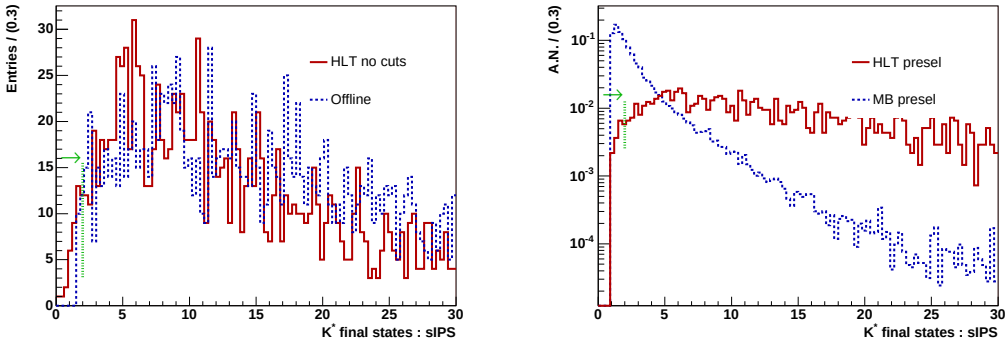

Figure 39: $B_d \to D^0 K^{*0}$, smallest impact paratemeter significance sIPS of K^{*0} products.

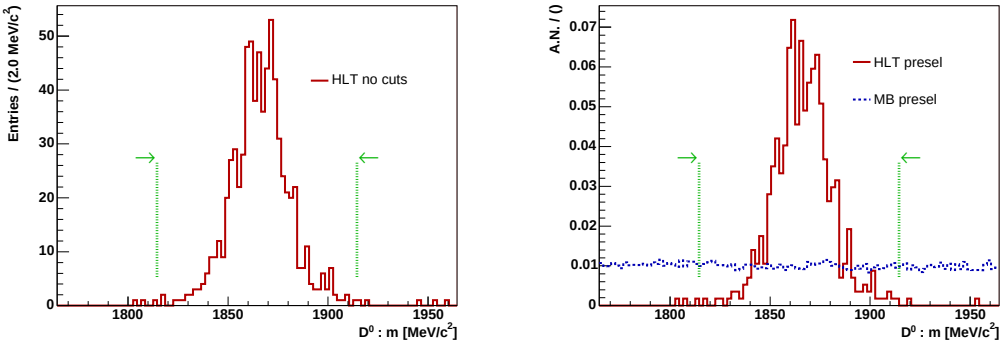

Figure 40: $B_d \to D^0 K^{*0}$, invariant mass m of D^0 [MeV/c^2].

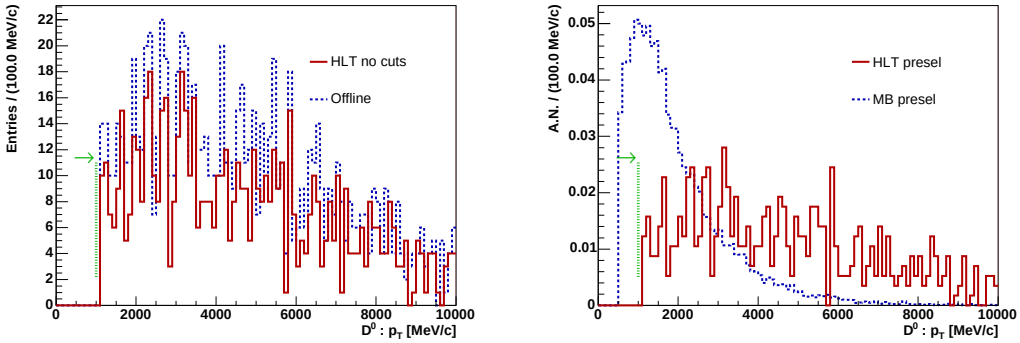

Figure 41: $B_d \to D^0 K^{*0}$, transverse momentum p_T of D^0 [MeV/c].

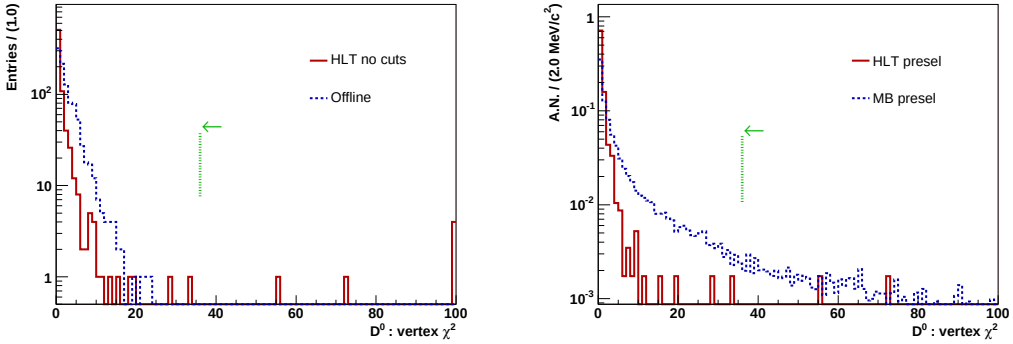

Figure 42: $B_d \to D^0 K^{*0}$, χ^2 of D^0 vertex.

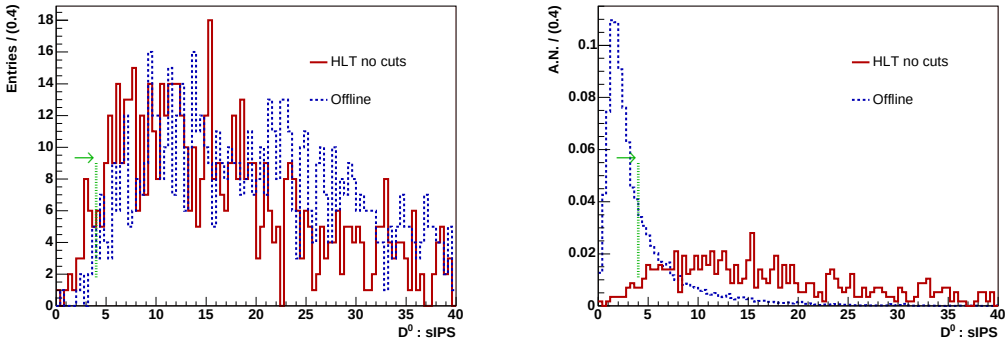

Figure 43: $B_d \rightarrow D^0 K^{*0}$, smallest impact paratemeter significance sIPS of D^0

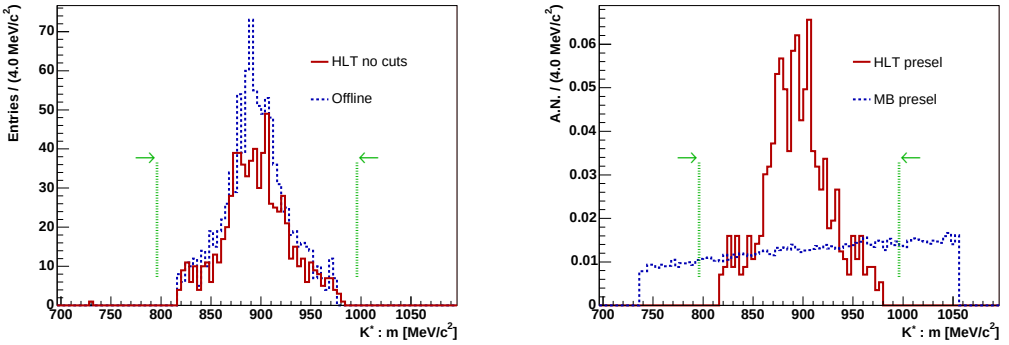

Figure 44: $B_d \rightarrow D^0 K^{*0}$, invariant mass m of K^{*0} [MeV/c^2].

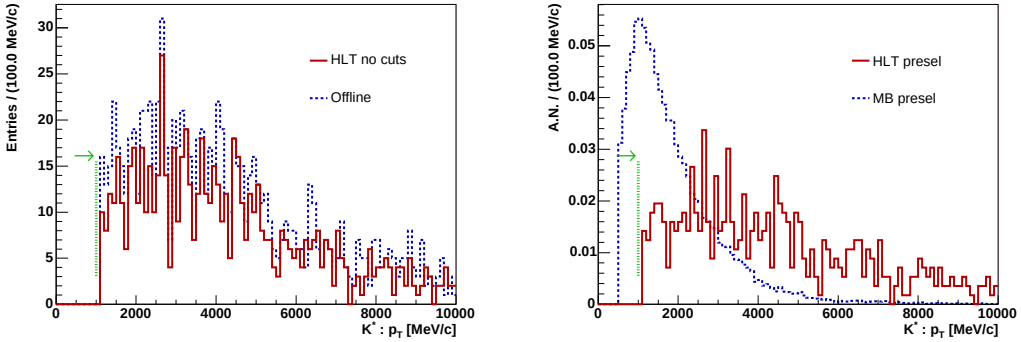

Figure 45: $B_d \rightarrow D^0 K^{*0}$, transverse momentum p_T of K^{*0} [MeV/c].

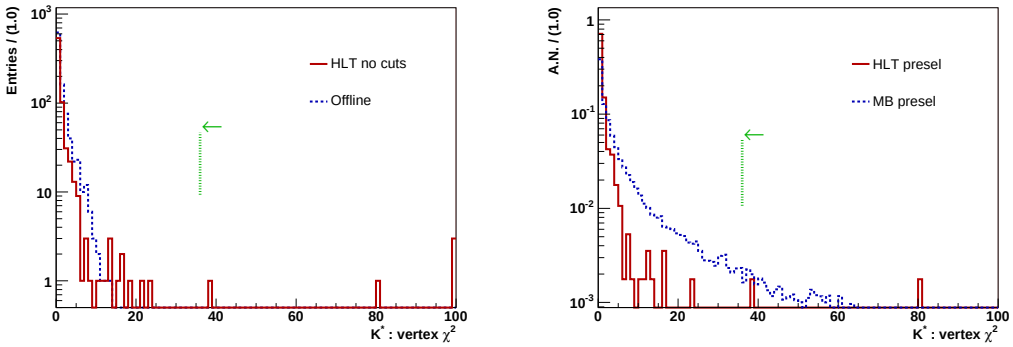

Figure 46: $B_d \rightarrow D^0K^{*0}$, χ^2 of K^{*0} vertex.

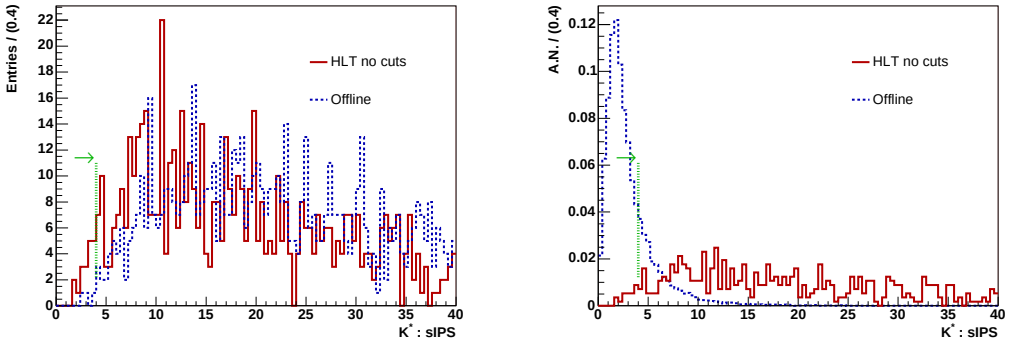

Figure 47: $B_d \rightarrow D^0K^{*0}$, smallest impact paratemeter significance sIPS of K^{*0}

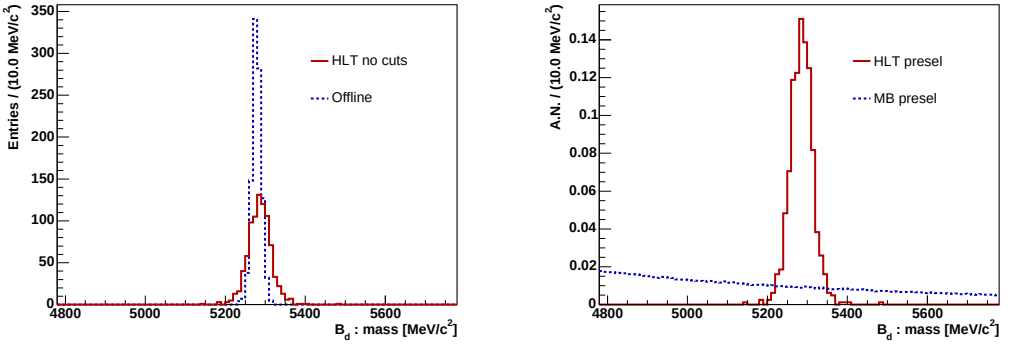

Figure 48: $B_d \rightarrow D^0K^{*0}$, invariant mass *m* of B_d [MeV/c^2].

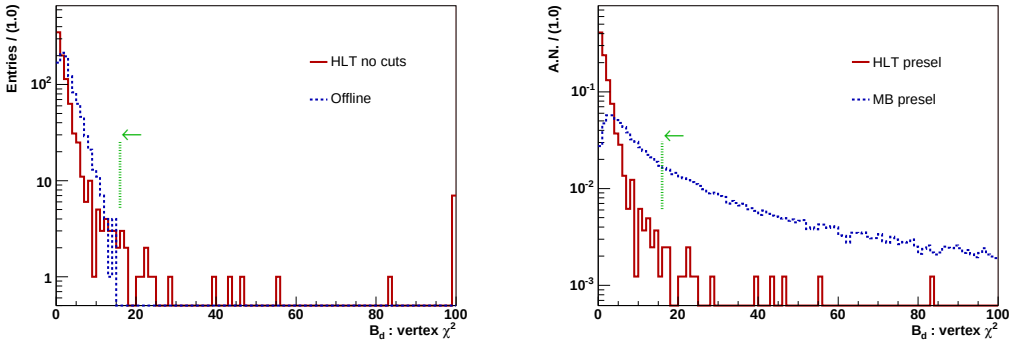

Figure 49: $B_d \to D^0 K^{*0}$, χ^2 of B_d vertex.

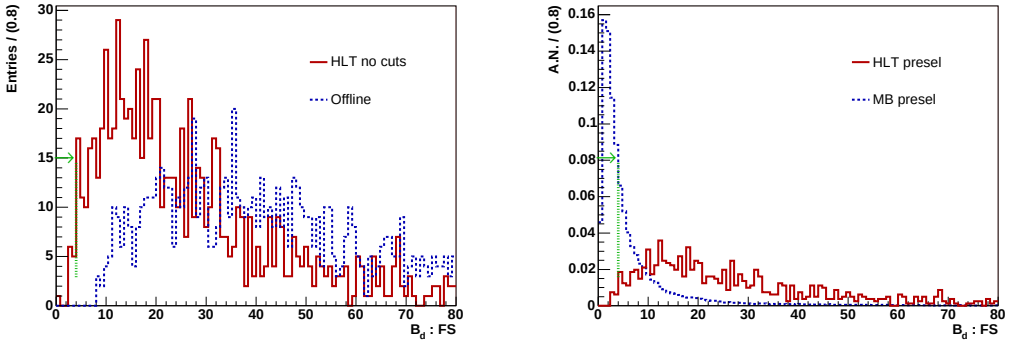

Figure 50: $B_d \to D^0 K^{*0}$, flight distance significance FS of B_d.

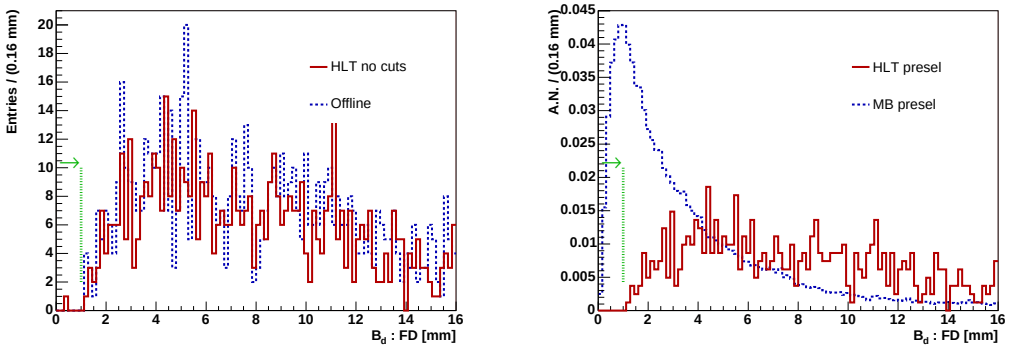

Figure 51: $B_d \to D^0 K^{*0}$, flight distance FD of B_d [mm].

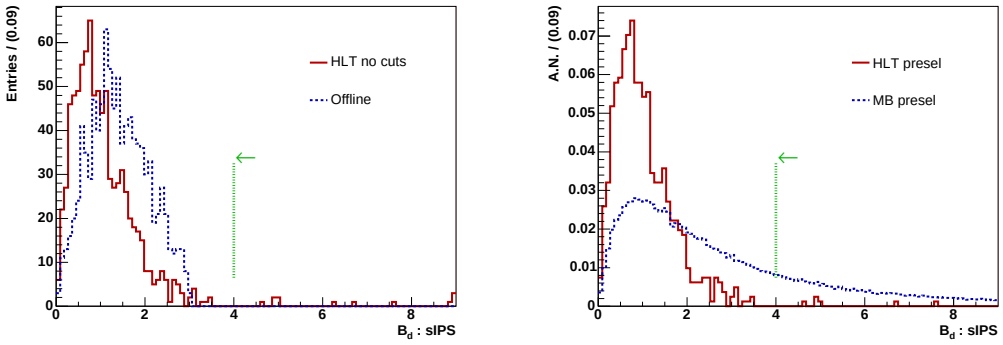

Figure 52: $B_d \to D^0 K^{*0}$, smallest impact paratemeter significance sIPS of B_d.

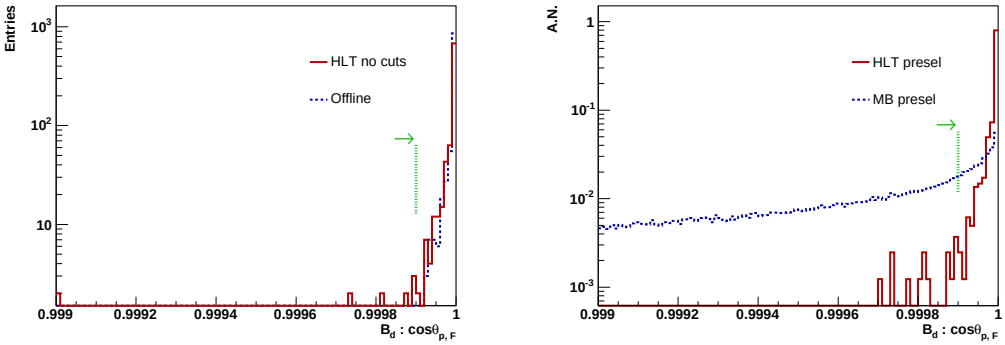

Figure 53: $B_d \to D^0 K^{*0}$, cosine of pointing angle $\cos\theta_{p,\mathrm{F}}$ of B_d.

1.5 $B_s \to \phi\phi$ plots

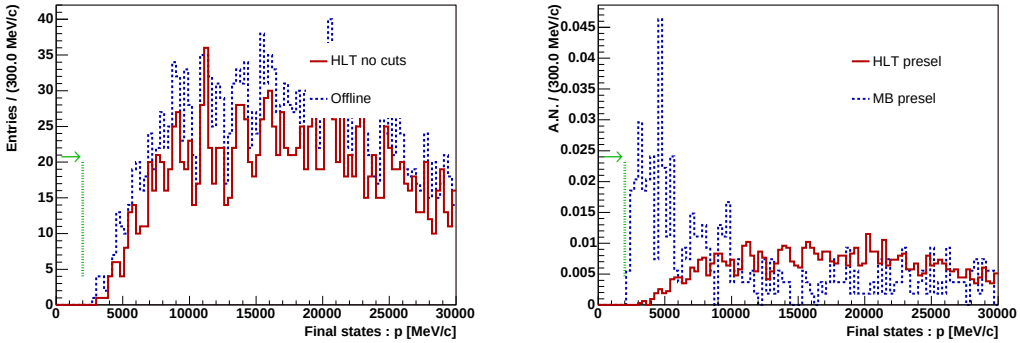

Figure 54: $B_s \to \phi\phi$, momentum p of ϕ products [MeV/c].

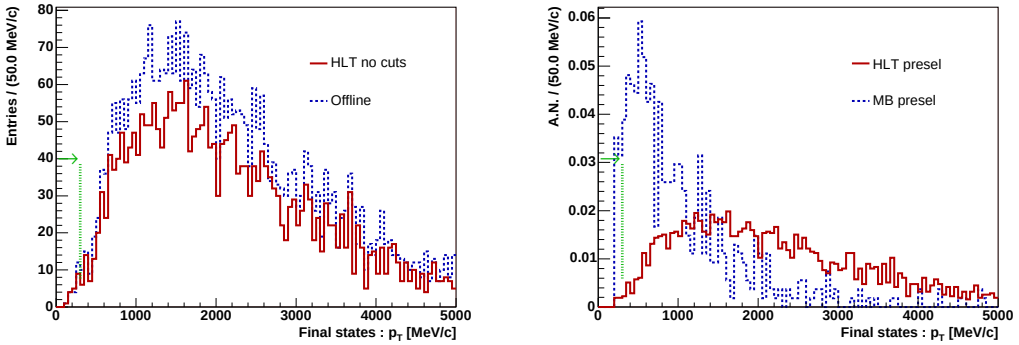

Figure 55: $B_s \to \phi\phi$, transverse momentum p_T of ϕ products [MeV/c].

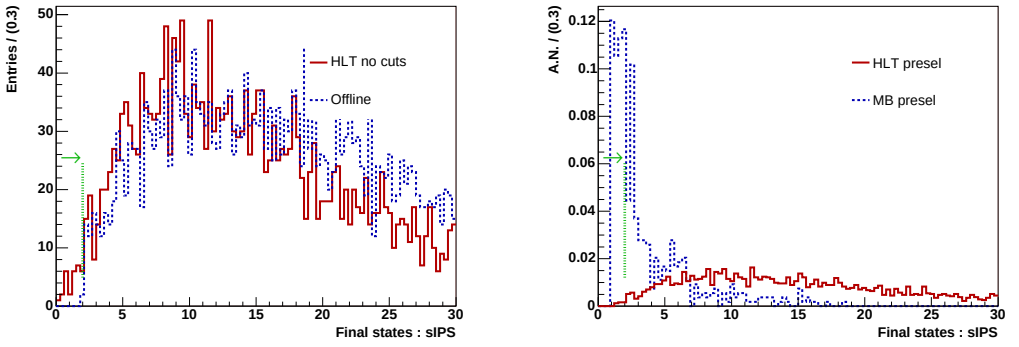

Figure 56: $B_s \to \phi\phi$, smallest impact paratemeter significance sIPS of ϕ products.

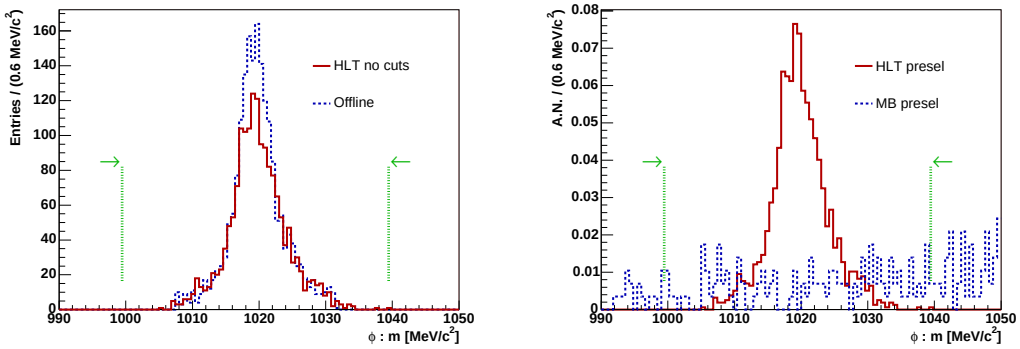

Figure 57: $B_s \to \phi\phi$, invariant mass m of ϕ [MeV/c^2].

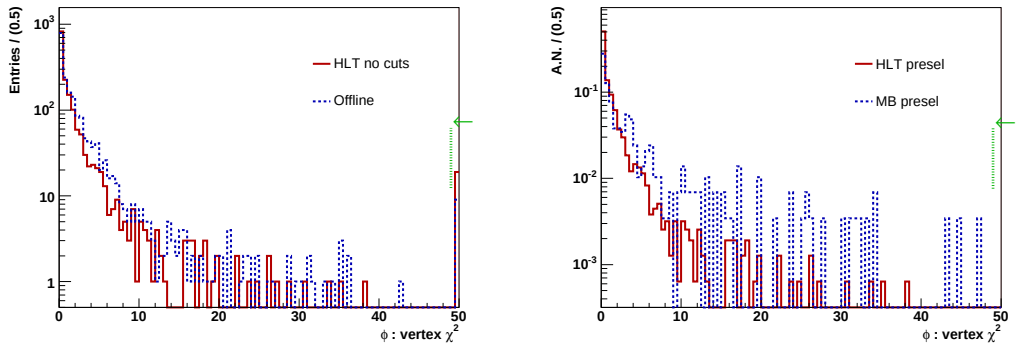

Figure 58: $B_s \to \phi\phi$, χ^2 of ϕ vertex.

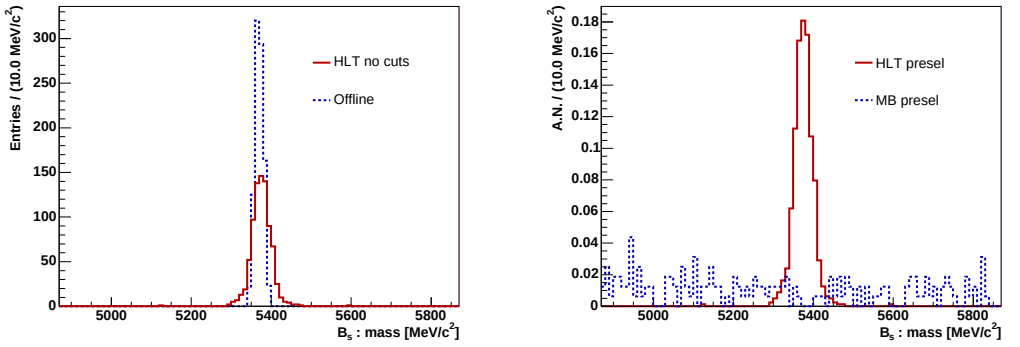

Figure 59: $B_s \to \phi\phi$, invariant mass m of B_s [MeV/c^2].

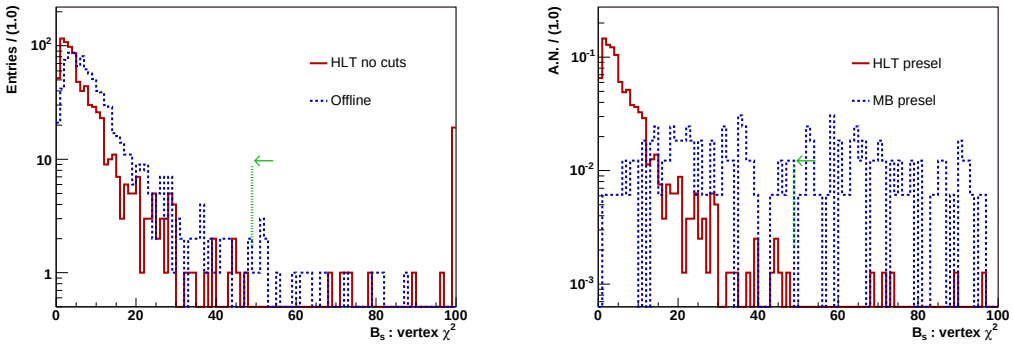

Figure 60: $B_s \to \phi\phi$, χ^2 of B_s vertex.

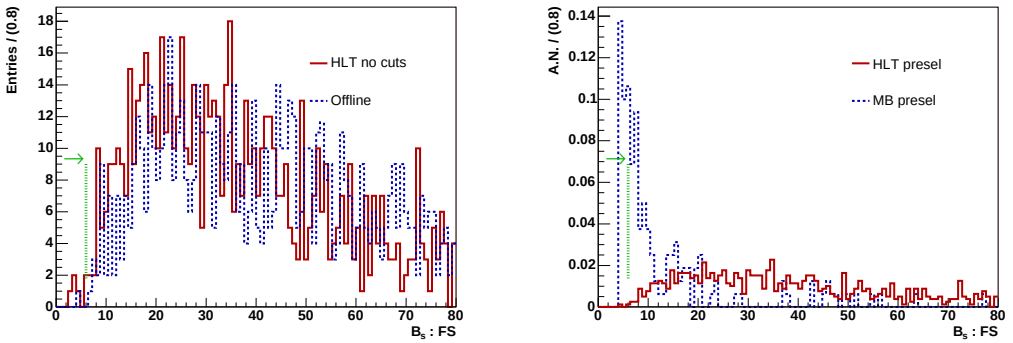

Figure 61: $B_s \to \phi\phi$, flight distance significance FS of B_s.

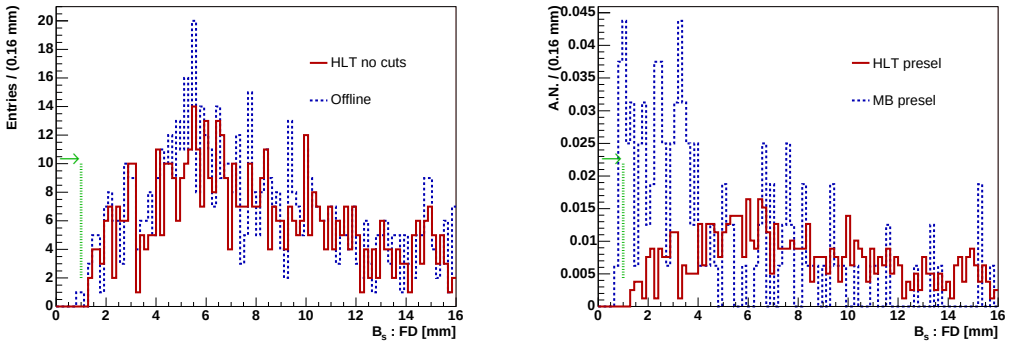

Figure 62: $B_s \to \phi\phi$, flight distance FD of B_s [mm].

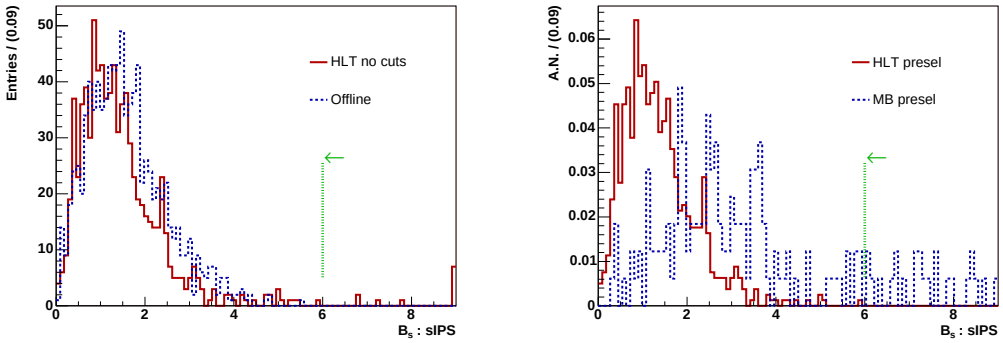

Figure 63: $B_s \to \phi\phi$, smallest impact paratemeter significance sIPS of B_s.

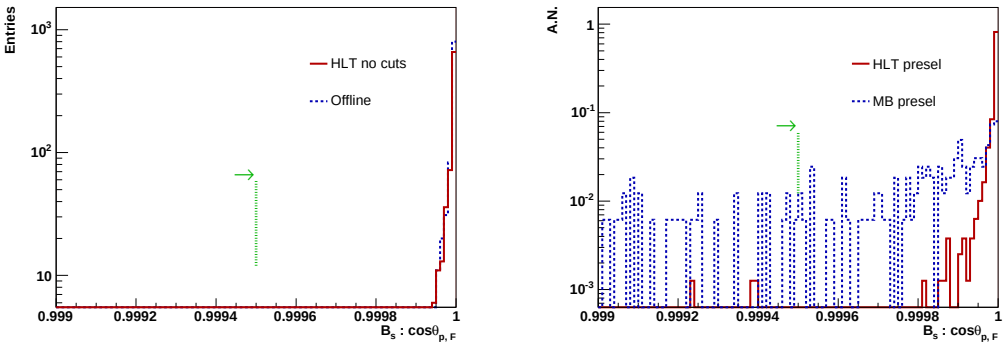

Figure 64: $B_s \to \phi\phi$, cosine of pointing angle $\cos\theta_{p,\mathrm{F}}$ of B_s.

1.6 $B_d \rightarrow D^*\pi$ plots

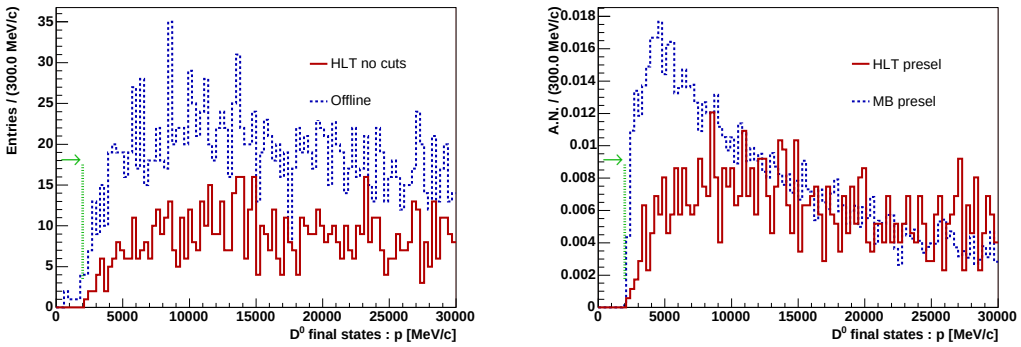

Figure 65: $B_d \to D^*\pi$, momentum p of D^0 products [MeV/c].

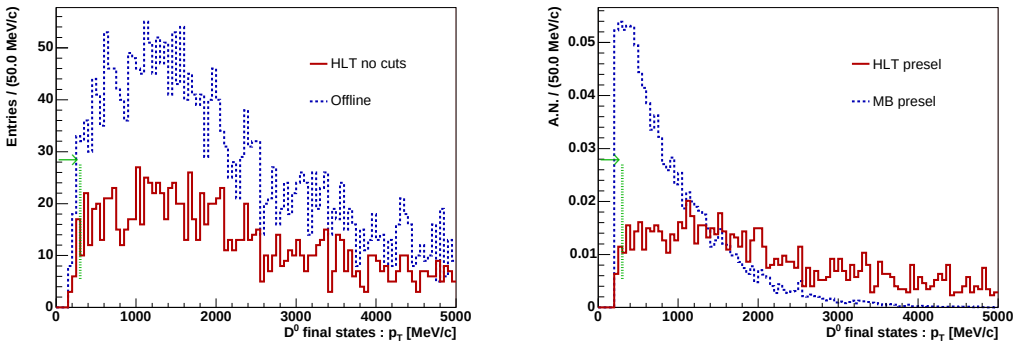

Figure 66: $B_d \to D^*\pi$, transverse momentum p_T of D^0 products [MeV/c].

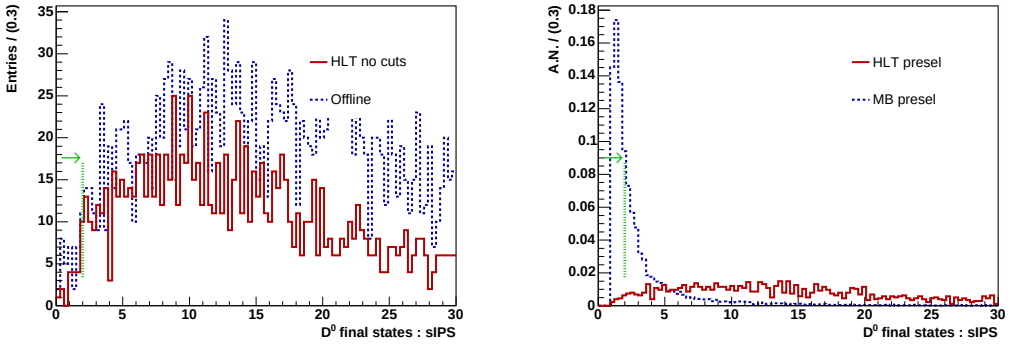

Figure 67: $B_d \to D^*\pi$, smallest impact paratemeter significance sIPS of D^0 products.

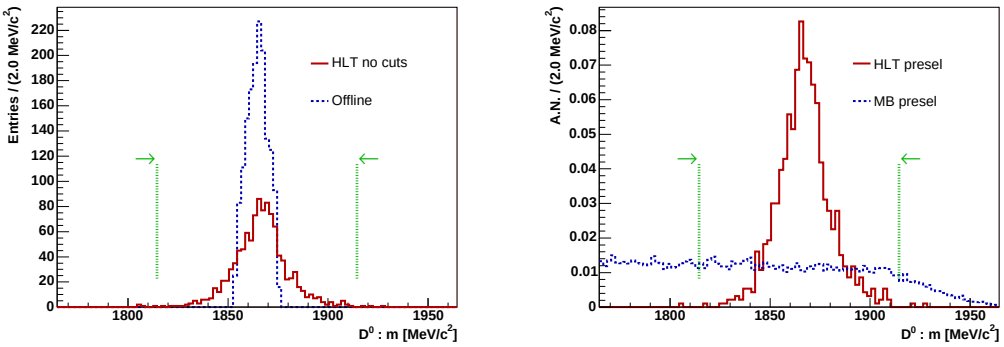

Figure 68: $B_d \to D^*\pi$, invariant mass m of D^0 [MeV/c^2].

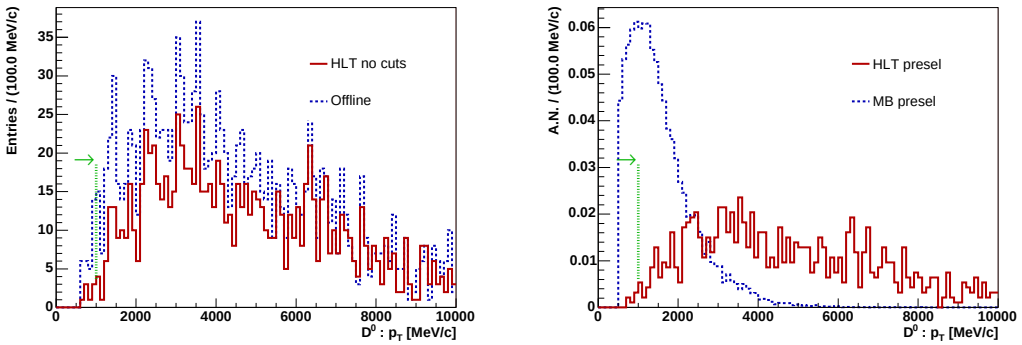

Figure 69: $B_d \to D^*\pi$, transverse momentum p_T of D^0 [MeV/c].

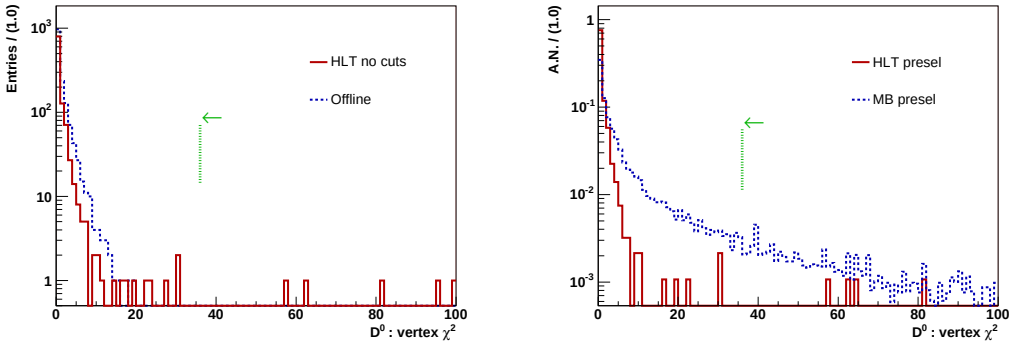

Figure 70: $B_d \to D^*\pi$, χ^2 of D^0 vertex.

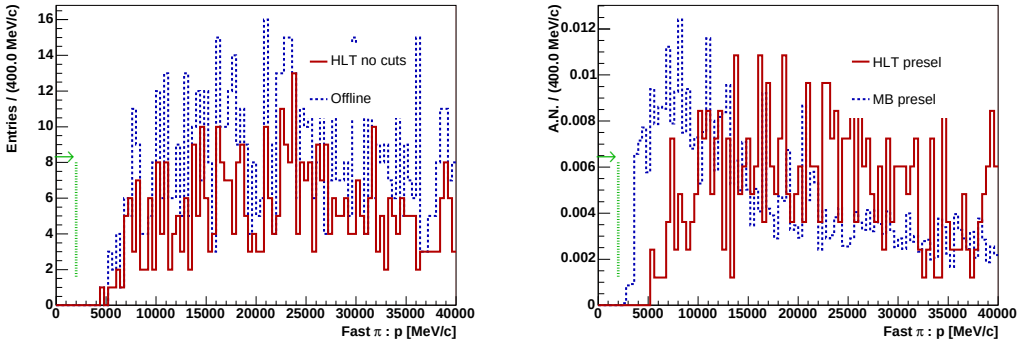

Figure 71: $B_d \to D^*\pi$, momentum p of fast π [MeV/c].

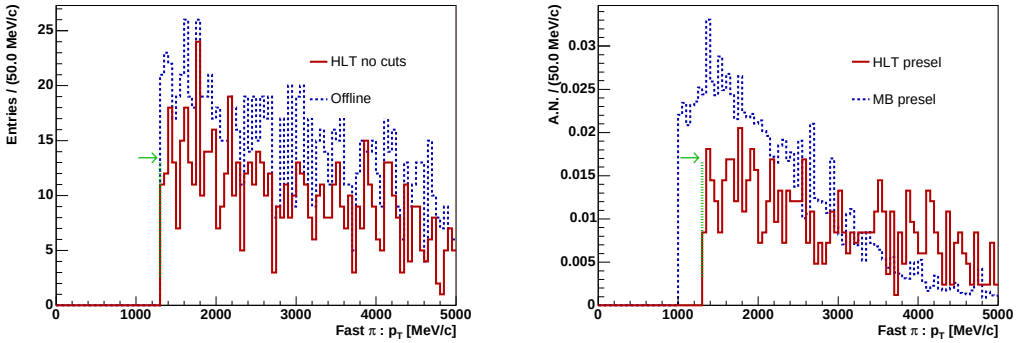

Figure 72: $B_d \to D^*\pi$, transverse momentum p_T of fast π [MeV/c].

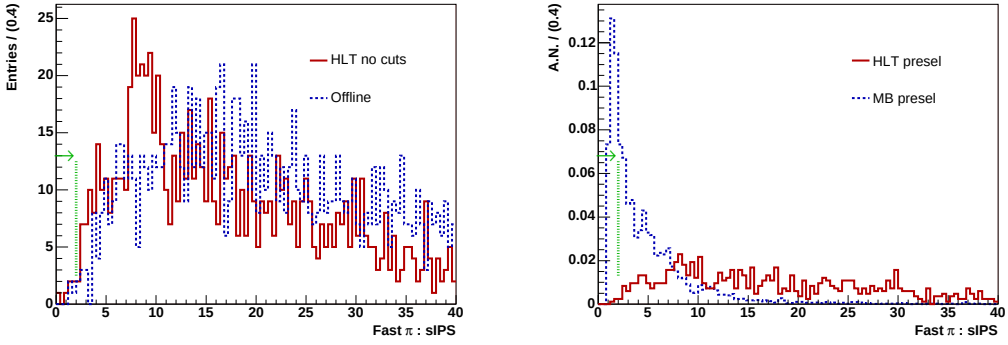

Figure 73: $B_d \to D^*\pi$, smallest impact paratemeter significance sIPS of fast π.

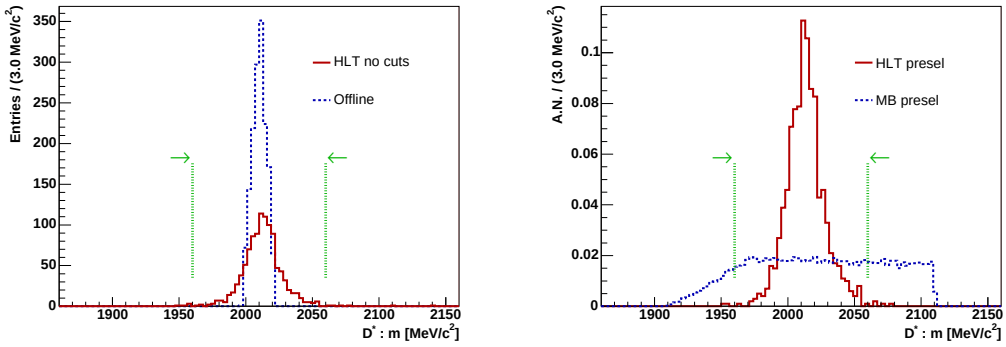

Figure 74: $B_d \to D^*\pi$, invariant mass m of D^* [MeV/c^2].

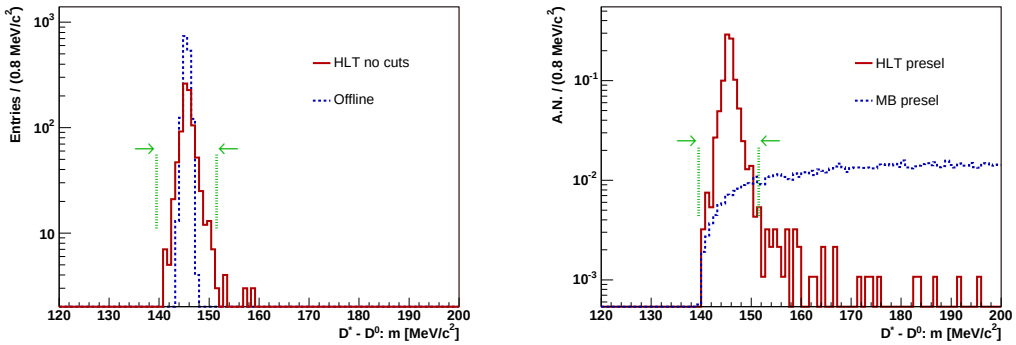

Figure 75: $B_d \to D^*\pi$, mass difference $m(D^*) - m(D^0)$ [MeV/c^2].

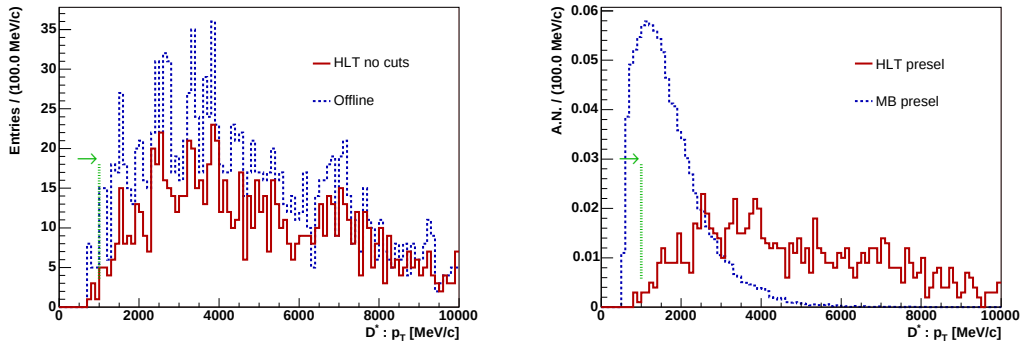

Figure 76: $B_d \to D^*\pi$, transverse momentum p_T of D^* [MeV/c].

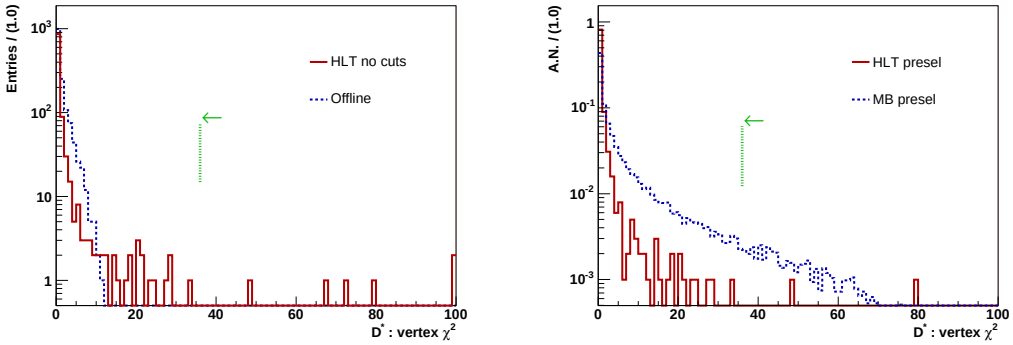

Figure 77: $B_d \rightarrow D^*\pi$, χ^2 of D^* vertex.

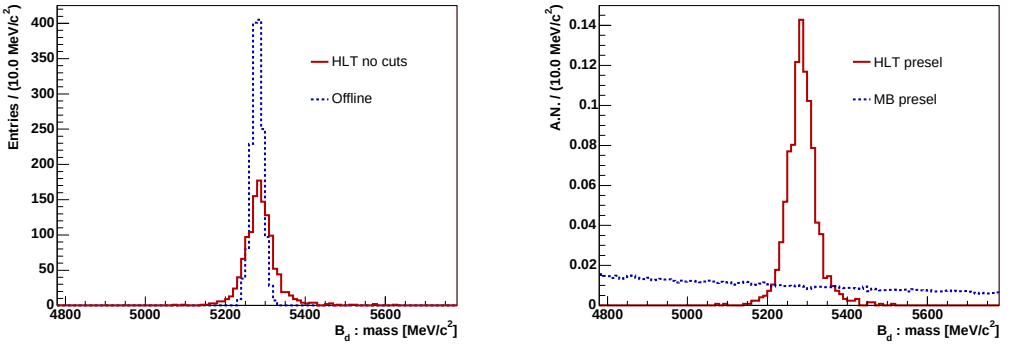

Figure 78: $B_d \rightarrow D^*\pi$, invariant mass m of B_d [MeV/c^2].

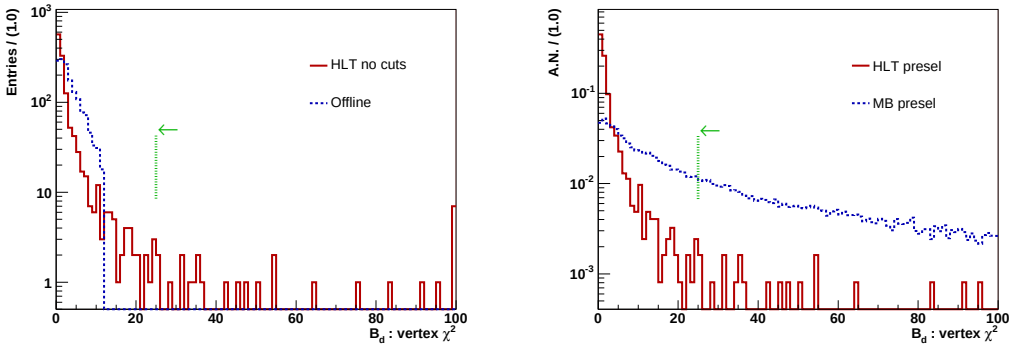

Figure 79: $B_d \rightarrow D^*\pi$, χ^2 of B_d vertex.

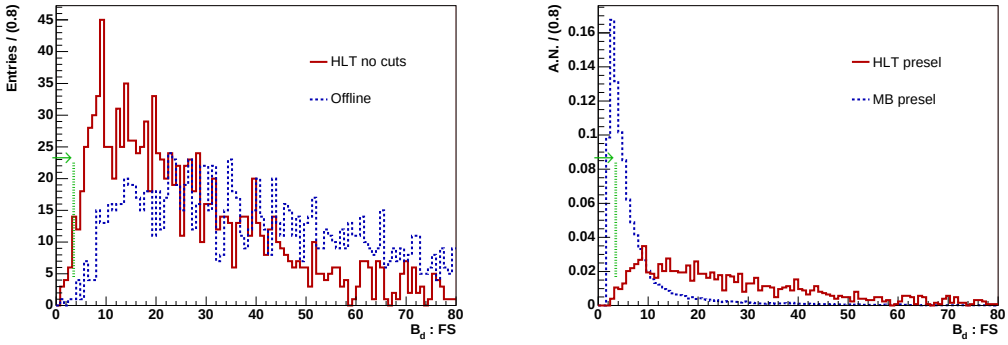

Figure 80: $B_d \rightarrow D^*\pi$, flight distance significance FS of B_d.

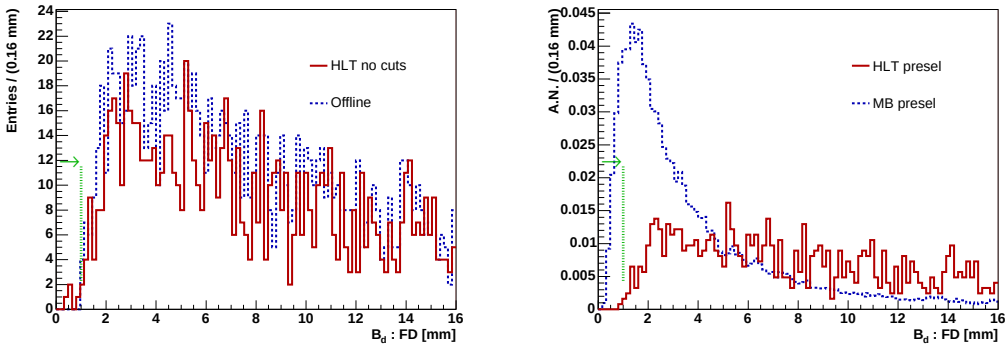

Figure 81: $B_d \rightarrow D^*\pi$, flight distance FD of B_d [mm].

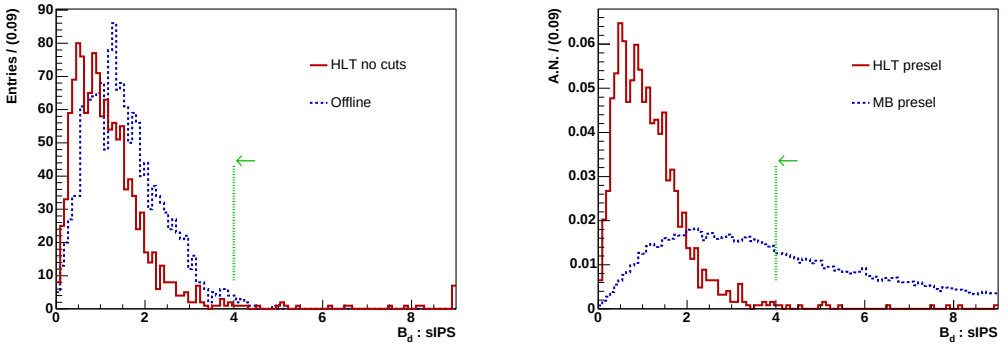

Figure 82: $B_d \rightarrow D^*\pi$, smallest impact paratemeter significance sIPS of B_d.

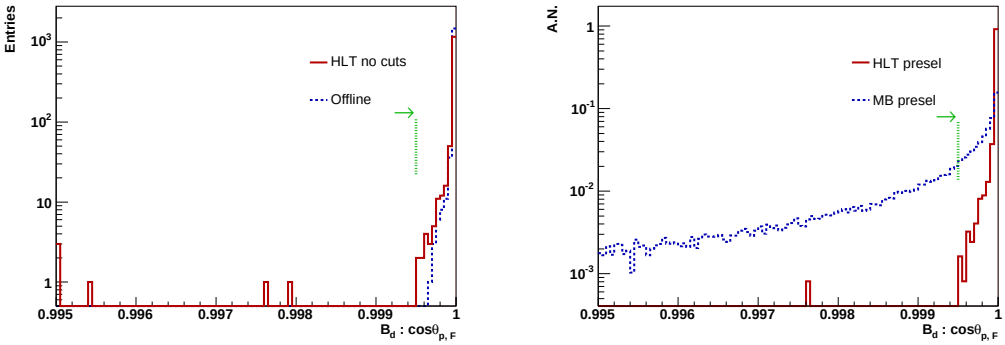

Figure 83: $B_d \to D^*\pi$, cosine of pointing angle $\cos\theta_{p,F}$ of B_d.

1.7 $B_d \to \mu^+\mu^- K^*$ plots

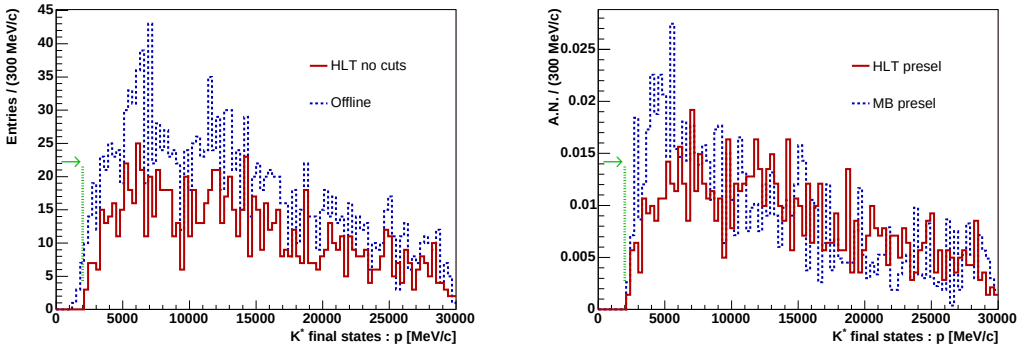

Figure 84: $B_d \to \mu^+\mu^- K^*$, momentum p of K^{*0} products [MeV/c].

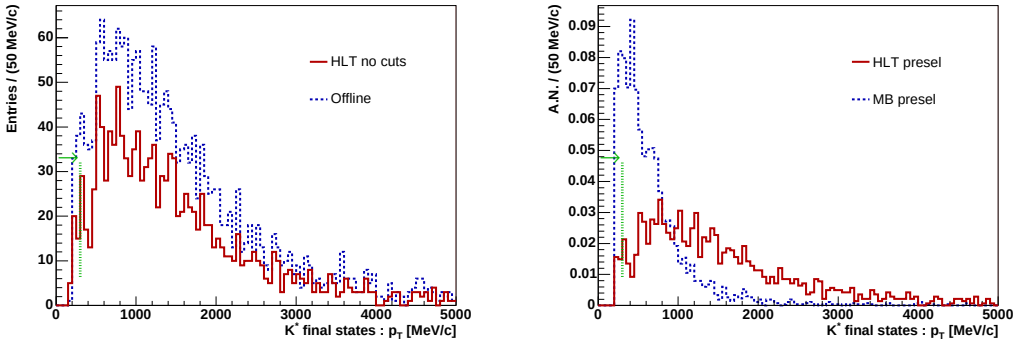

Figure 85: $B_d \to \mu^+\mu^- K^*$, transverse momentum p_T of K^{*0} products [MeV/c].

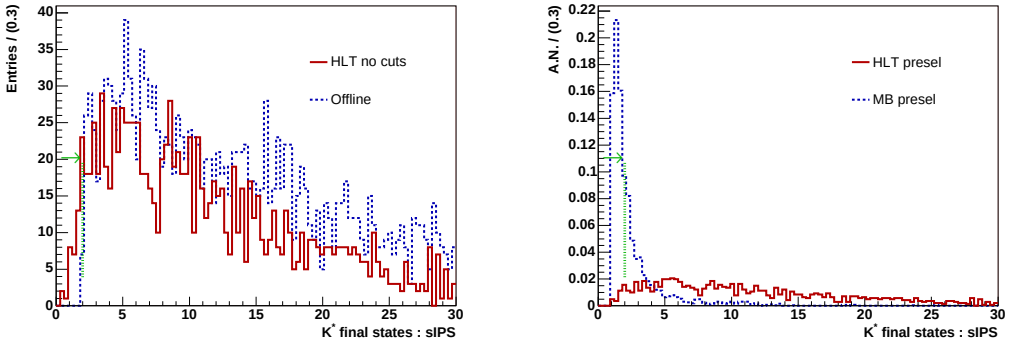

Figure 86: $B_d \to \mu^+\mu^- K^*$, smallest impact paratemeter significance sIPS of K^{*0} products.

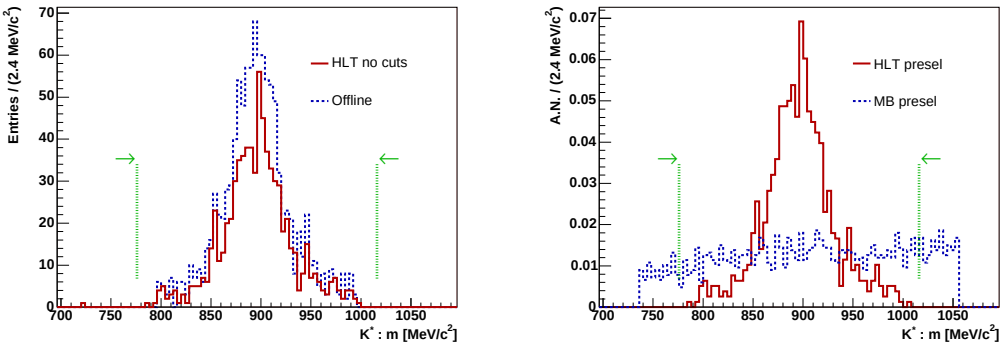

Figure 87: $B_d \to \mu^+\mu^- K^*$, invariant mass m of K^{*0} [MeV/c^2].

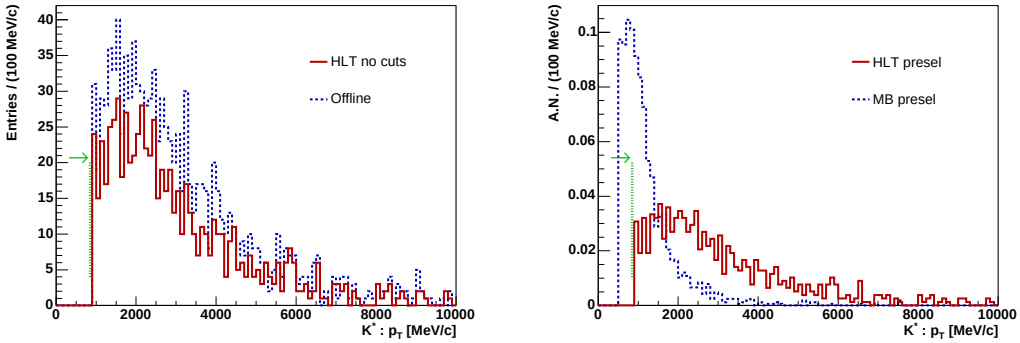

Figure 88: $B_d \to \mu^+\mu^- K^*$, transverse momentum p_T of K^{*0} [MeV/c].

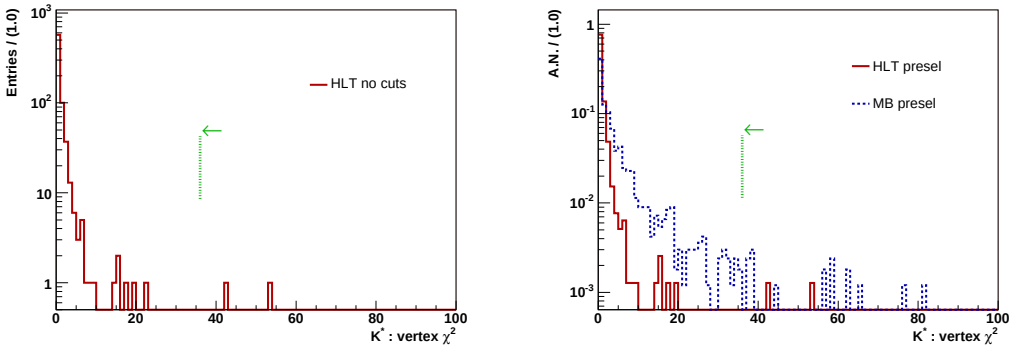

Figure 89: $B_d \to \mu^+\mu^- K^*$, χ^2 of K^{*0} vertex.

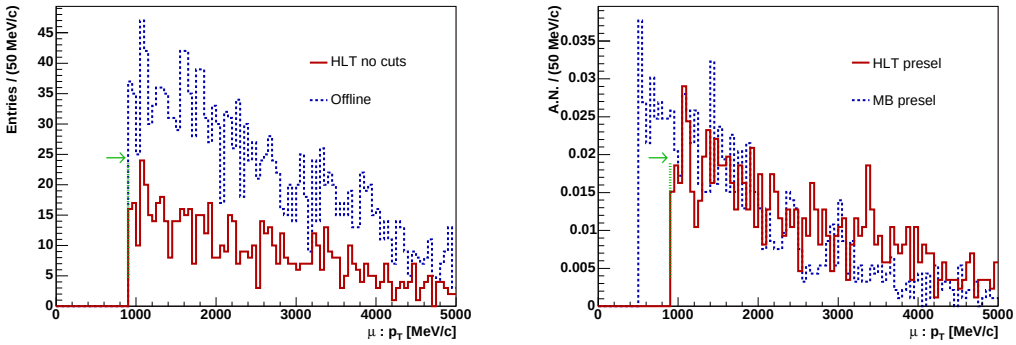

Figure 90: $B_d \to \mu^+\mu^- K^*$, transverse momentum p_T of muons [MeV/c].

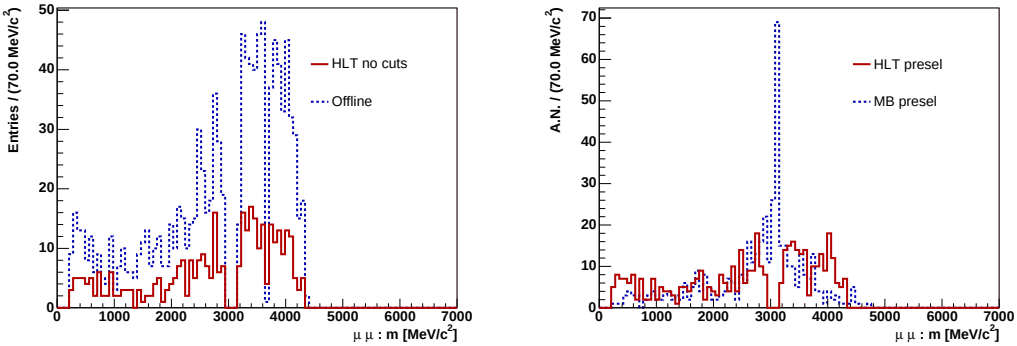

Figure 91: $B_d \to \mu^+\mu^- K^*$, invariant di-muon mass m[MeV/c^2].

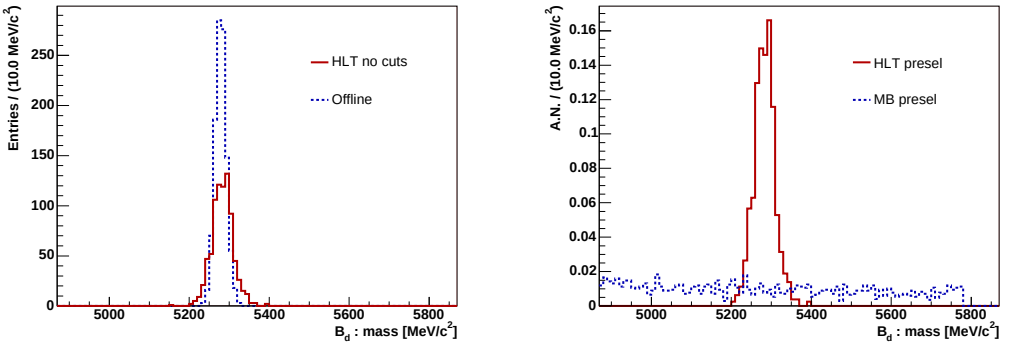

Figure 92: $B_d \to \mu^+\mu^- K^*$, invariant mass m of B_d [MeV/c^2].

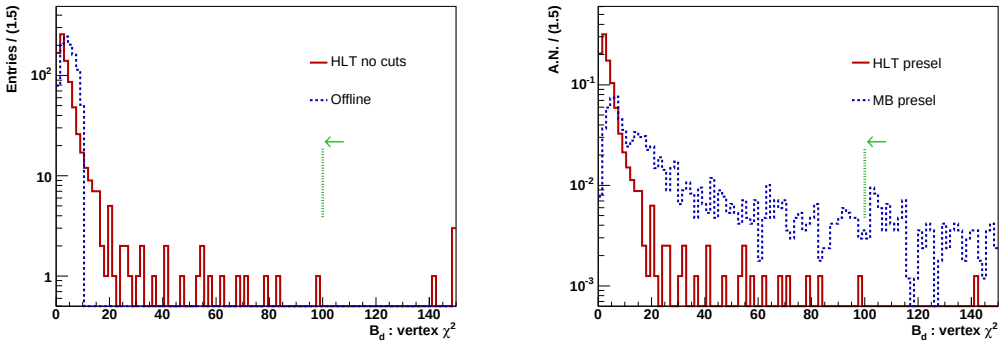

Figure 93: $B_d \to \mu^+\mu^- K^*$, χ^2 of B_d vertex.

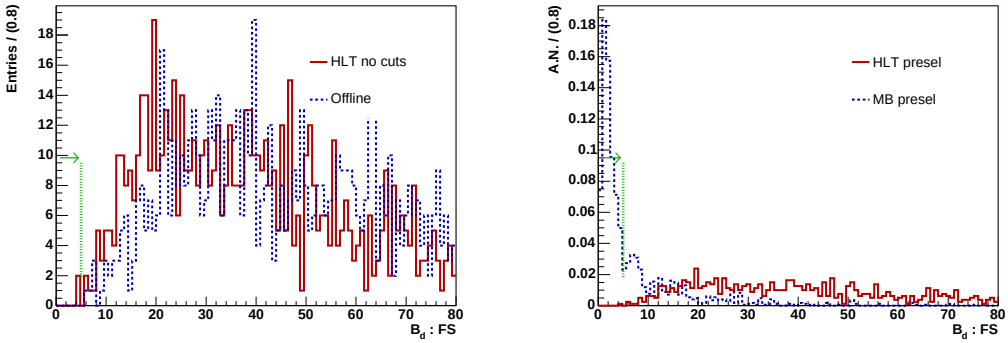

Figure 94: $B_d \to \mu^+\mu^- K^*$, flight distance significance FS of B_d.

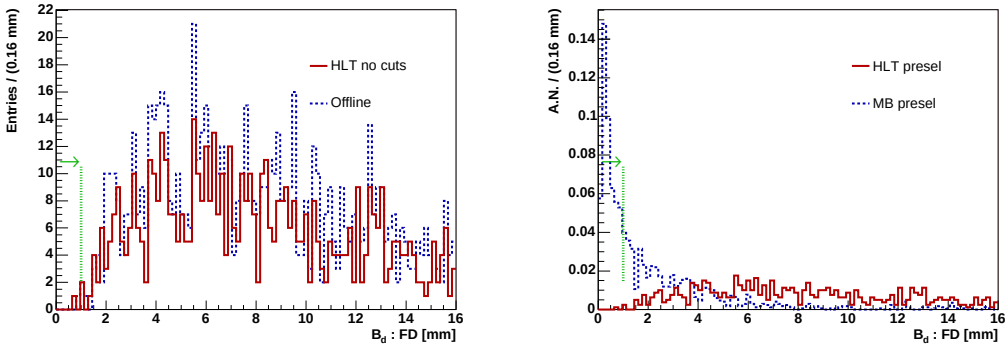

Figure 95: $B_d \to \mu^+\mu^- K^*$, flight distance FD of B_d [mm].

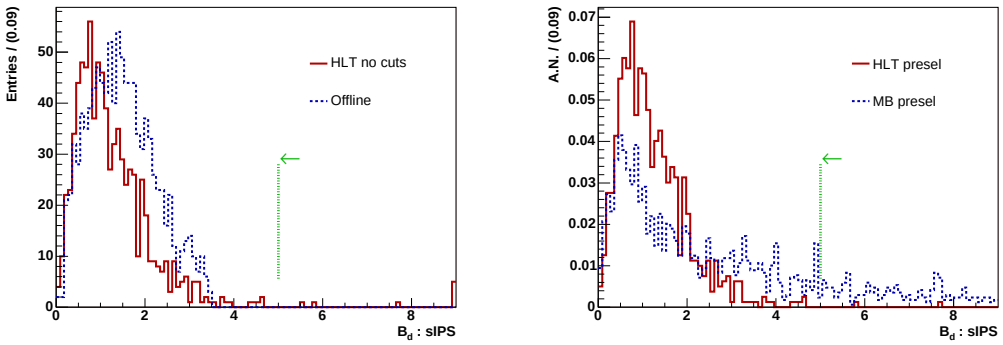

Figure 96: $B_d \to \mu^+\mu^- K^*$, smallest impact paratemeter significance sIPS of B_d.

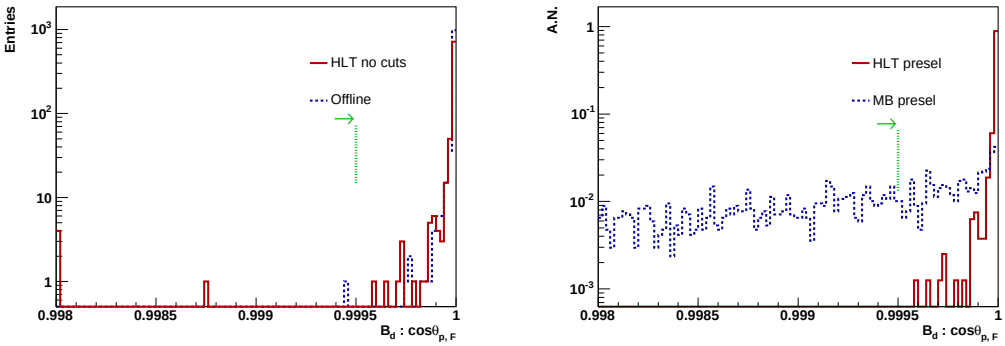

Figure 97: $B_d \to \mu^+\mu^- K^*$, cosine of pointing angle $\cos\theta_{p,F}$ of B_d.

1.8 $B_s \to \mu^+\mu^-$ plots

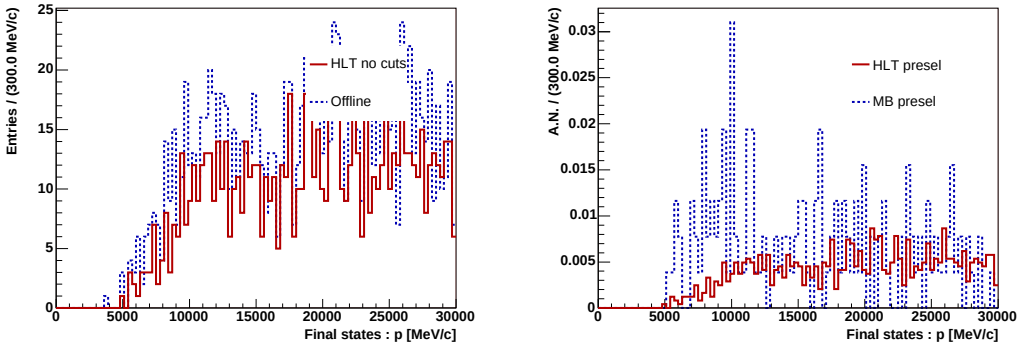

Figure 98: $B_s \to \mu^+\mu^-$, momentum p of B_s products [MeV/c].

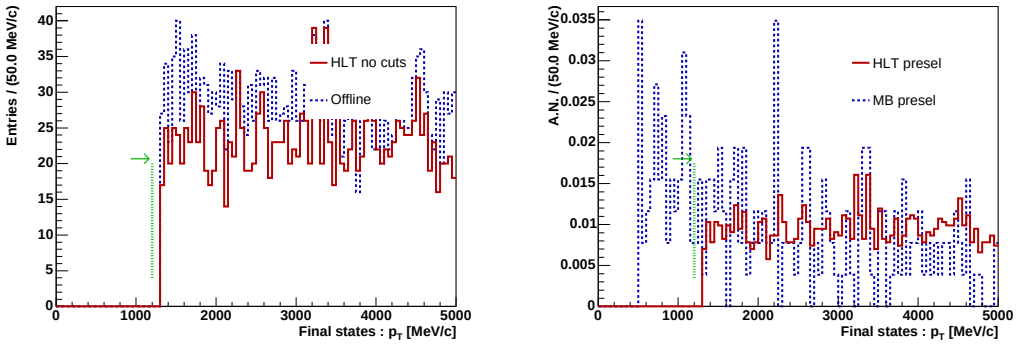

Figure 99: $B_s \to \mu^+\mu^-$, transverse momentum p_T of B_s products [MeV/c].

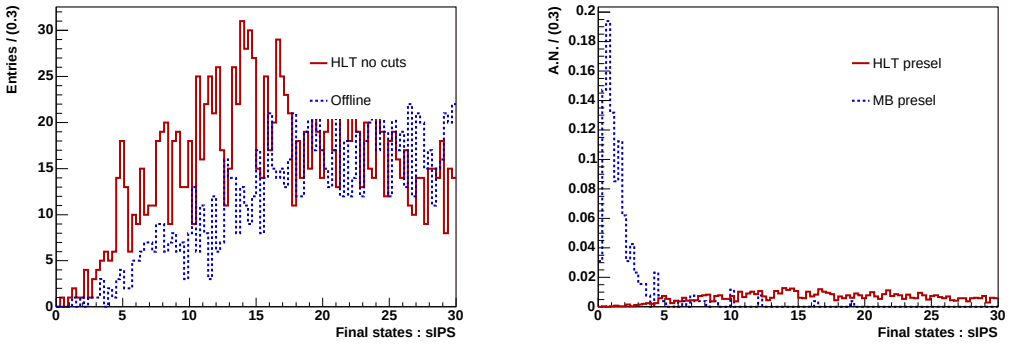

Figure 100: $B_s \to \mu^+\mu^-$, smallest impact paratemeter significance sIPS of B_s products.

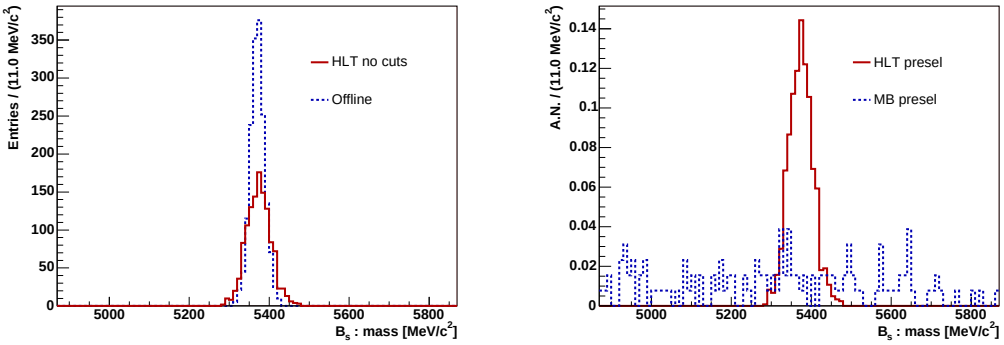

Figure 101: $B_s \to \mu^+\mu^-$, invariant mass m of B_s [MeV/c^2].

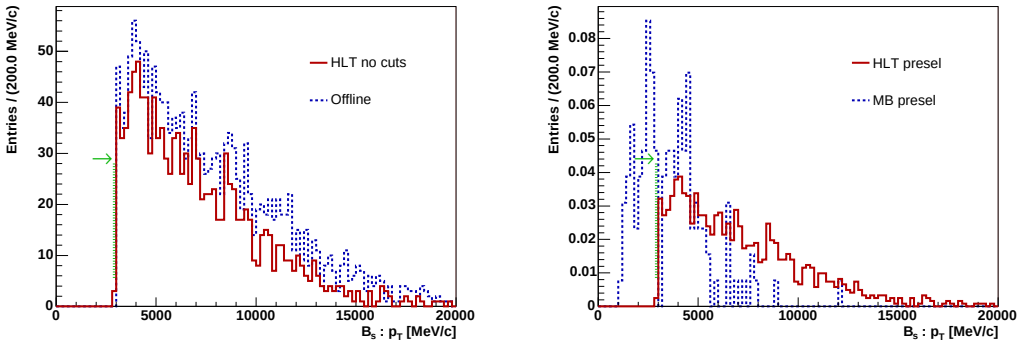

Figure 102: $B_s \to \mu^+\mu^-$, transverse momentum p_T of B_s [MeV/c].

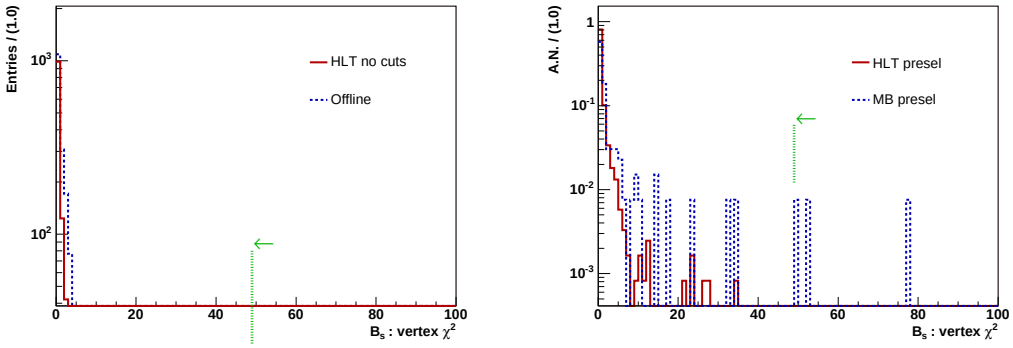

Figure 103: $B_s \to \mu^+\mu^-$, χ^2 of B_s vertex.

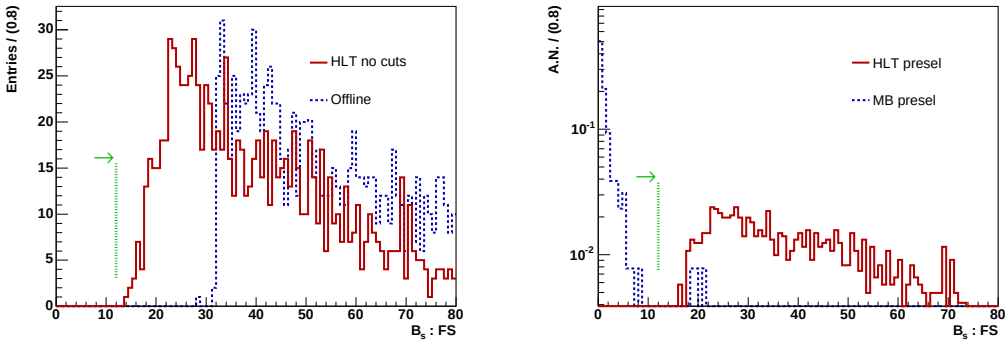

Figure 104: $B_s \to \mu^+\mu^-$, flight distance significance FS of B_s.

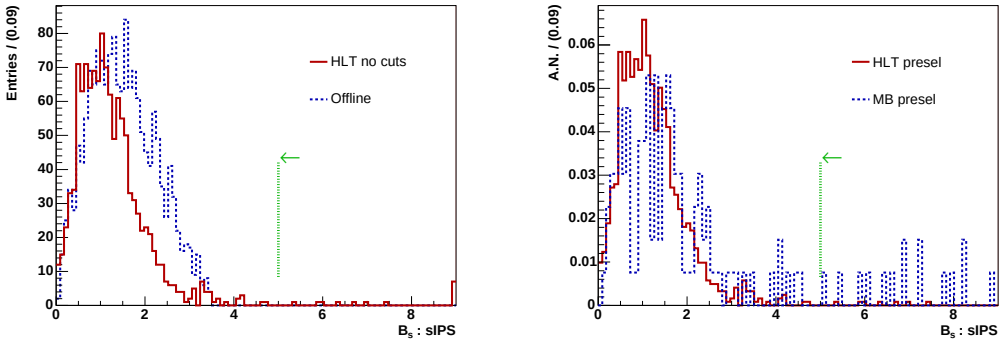

Figure 105: $B_s \to \mu^+\mu^-$, smallest impact paratemeter significance sIPS of B_s.

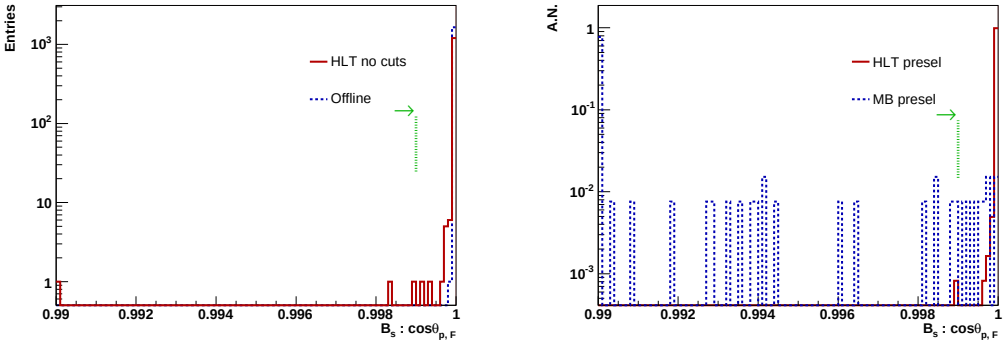

Figure 106: $B_s \to \mu^+\mu^-$, cosine of pointing angle $\cos\theta_{p,\mathrm{F}}$ of B_s.

1.9 $B_s \to \phi\gamma$ plots

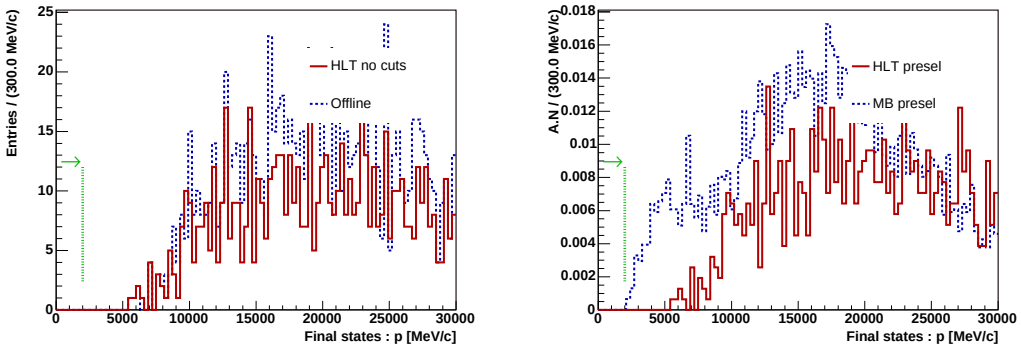

Figure 107: $B_s \to \phi\gamma$, momentum p of ϕ products [MeV/c].

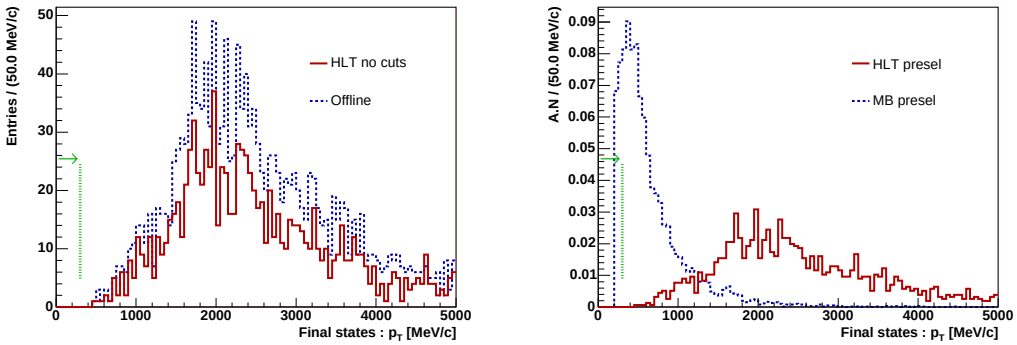

Figure 108: $B_s \to \phi\gamma$, transverse momentum p_T of ϕ products [MeV/c].

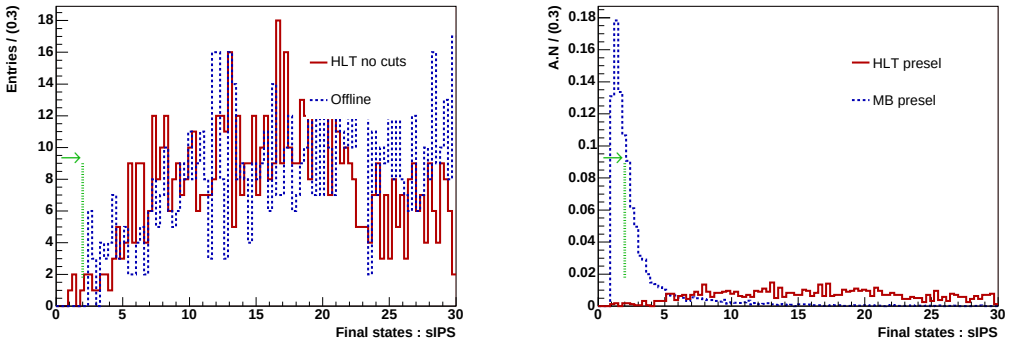

Figure 109: $B_s \to \phi\gamma$, smallest impact paratemeter significance sIPS of ϕ products.

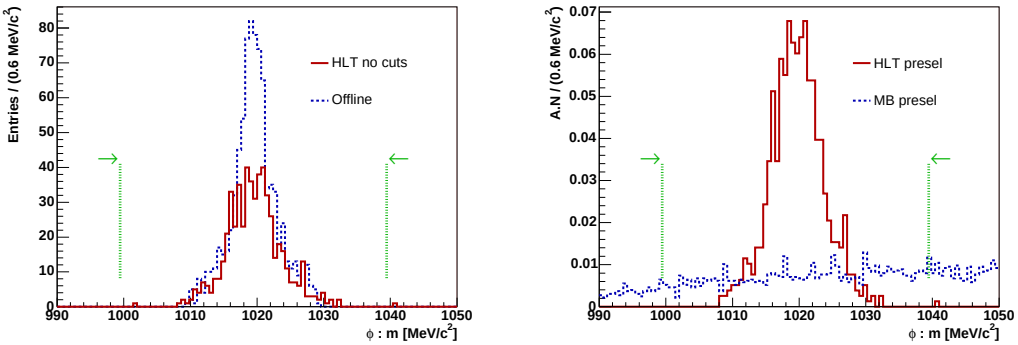

Figure 110: $B_s \to \phi\gamma$, invariant mass m of ϕ [MeV/c^2].

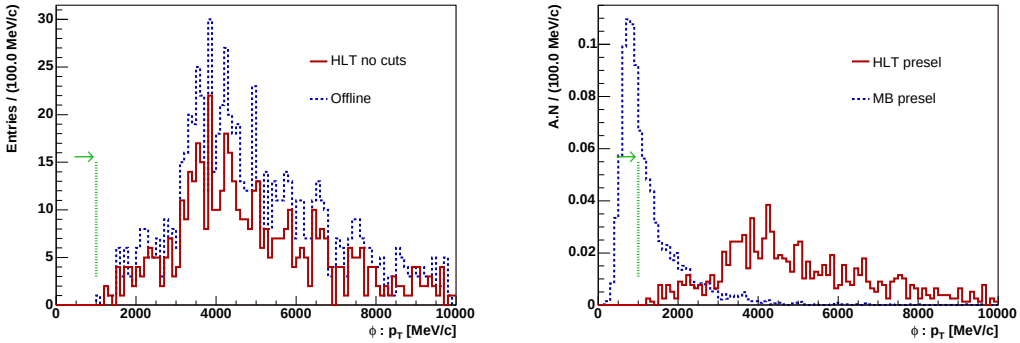

Figure 111: $B_s \to \phi\gamma$, transverse momentum p_T of ϕ [MeV/c].

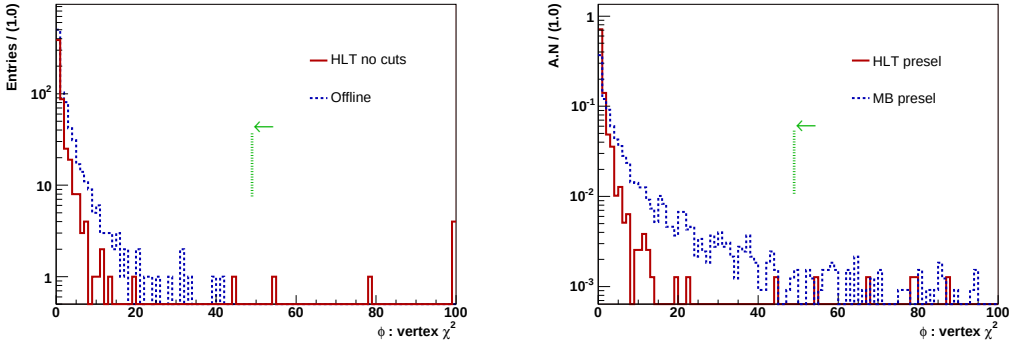

Figure 112: $B_s \to \phi\gamma$, χ^2 of ϕ vertex.

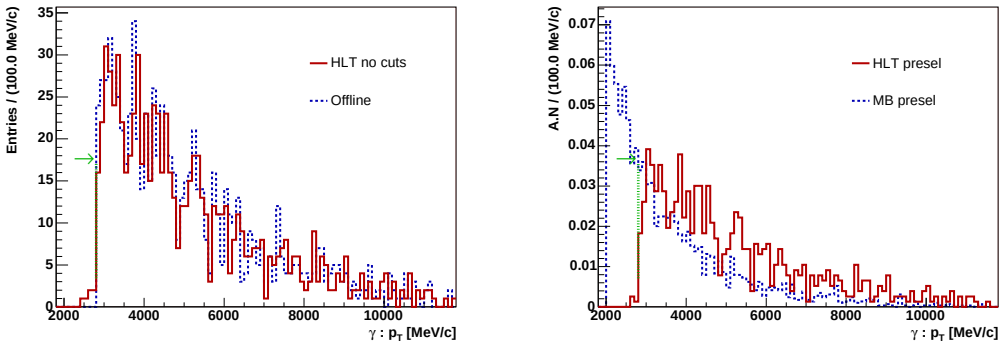

Figure 113: $B_s \to \phi\gamma$, transverse energy E_T of γ [MeV].

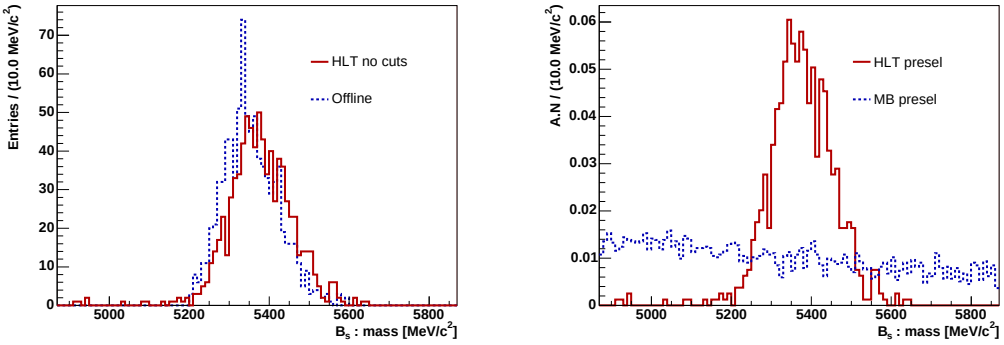

Figure 114: $B_s \to \phi\gamma$, invariant mass m of B_s [MeV/c^2].

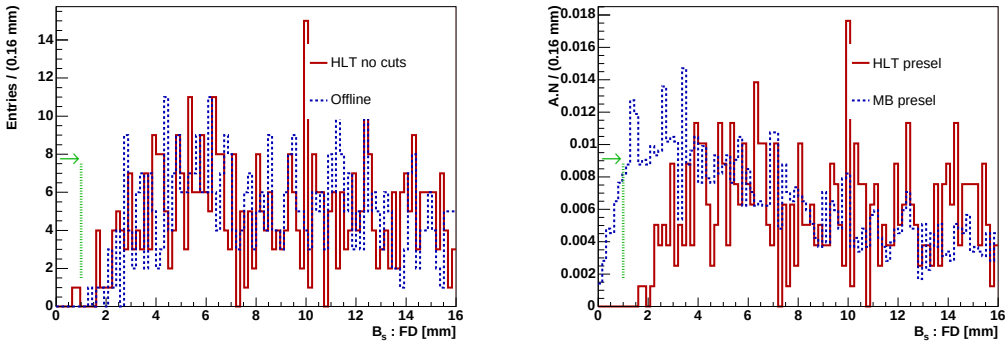

Figure 115: $B_s \to \phi\gamma$, flight distance FD of B_s [mm].

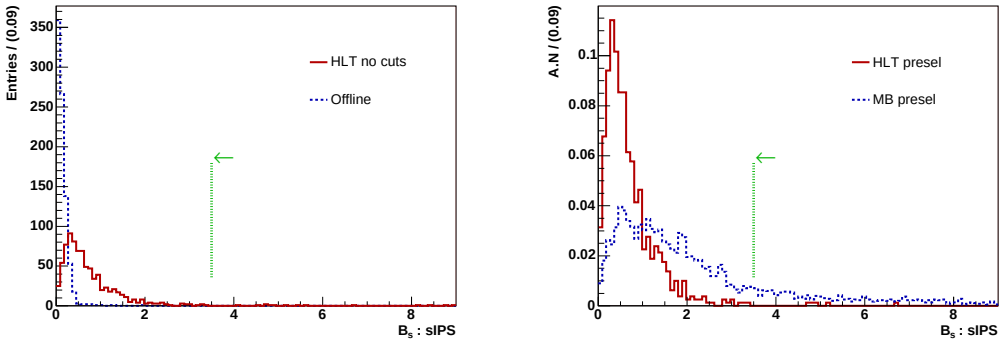

Figure 116: $B_s \to \phi\gamma$, smallest impact paratemeter significance sIPS of B_s.

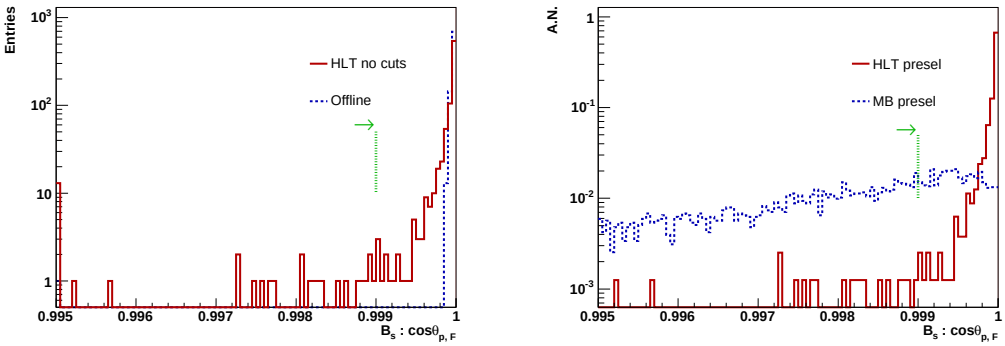

Figure 117: $B_s \to \phi\gamma$, cosine of pointing angle $\cos\theta_{p,\mathrm{F}}$ of B_s.

1.10 D^* plots

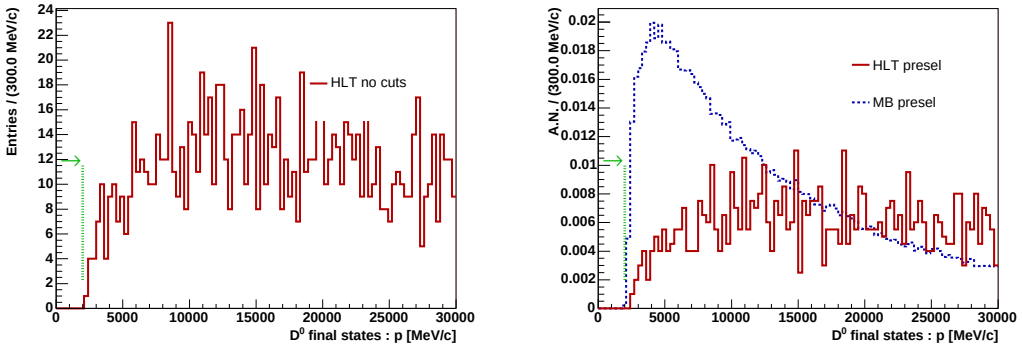

Figure 118: D*, momentum p of D^0 products [MeV/c].

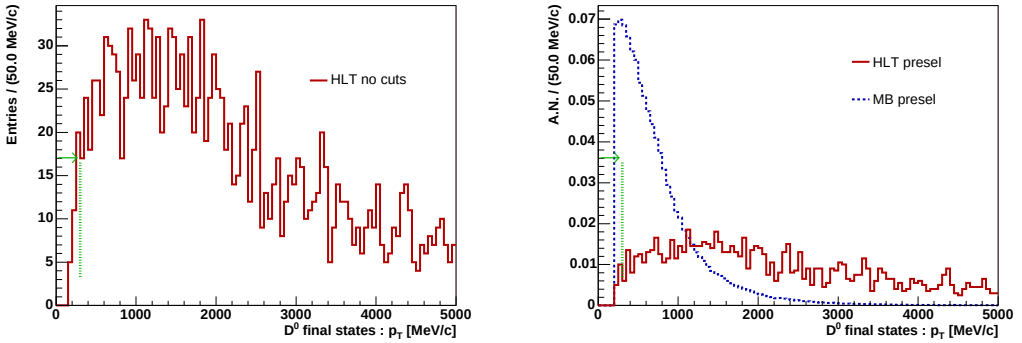

Figure 119: D*, transverse momentum p_{T} of D^0 products [MeV/c].

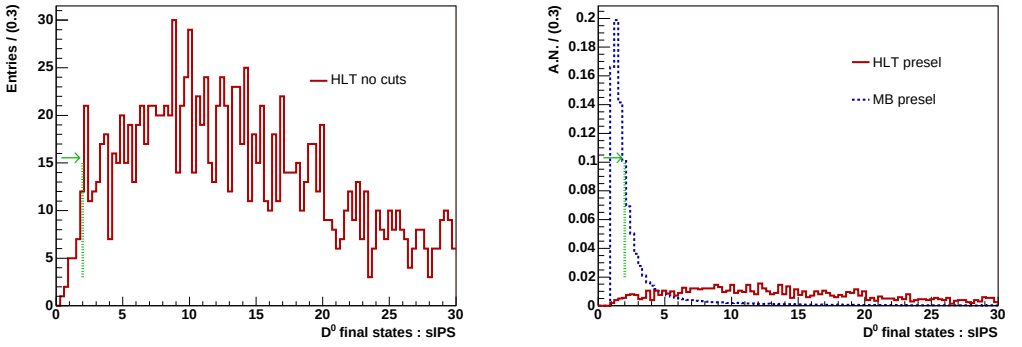

Figure 120: D*, smallest impact paratemeter significance sIPS of D^0 products.

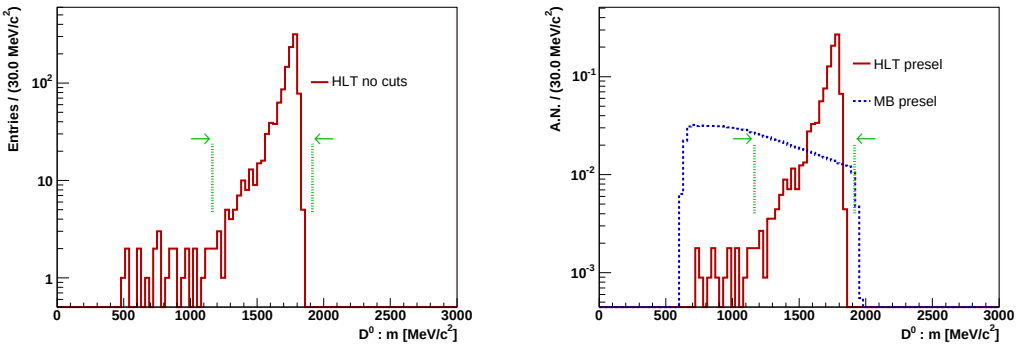

Figure 121: D*, invariant mass m of D^0 [MeV/c^2].

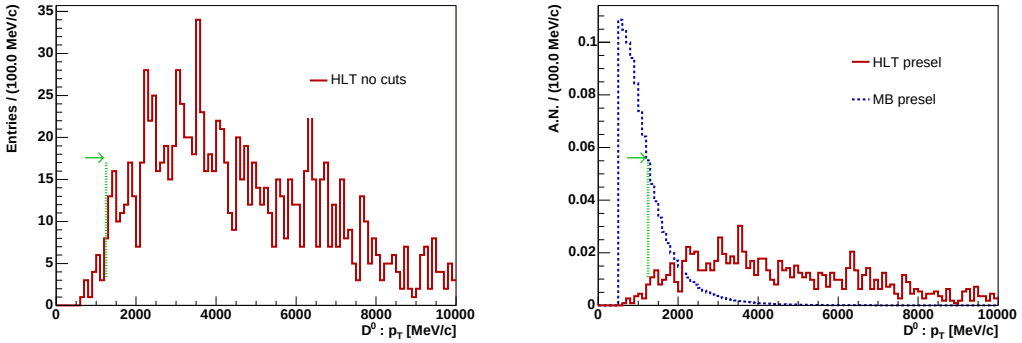

Figure 122: D*, transverse momentum p_{T} of D^0 [MeV/c].

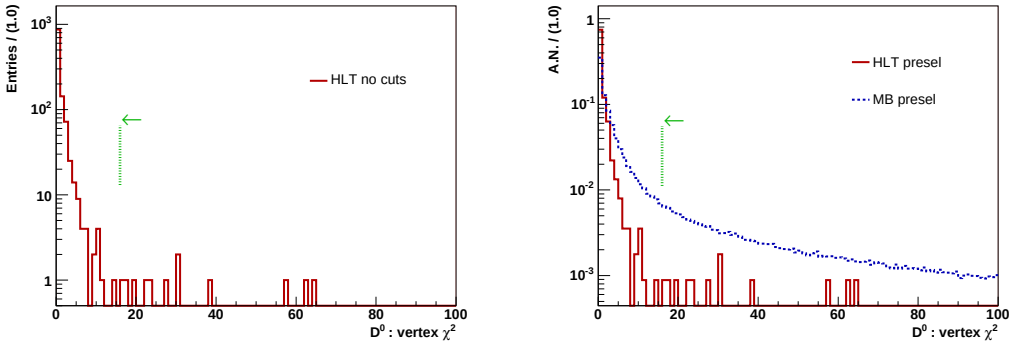

Figure 123: D*, χ^2 of D^0 vertex.

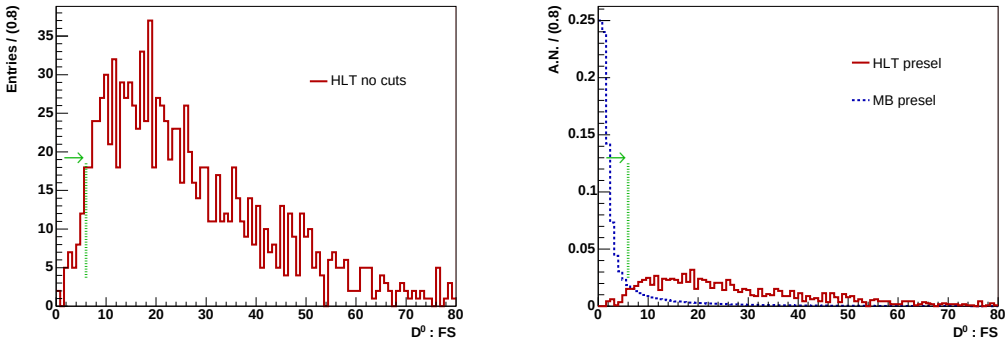

Figure 124: D*, flight distance significance FS of D^0.

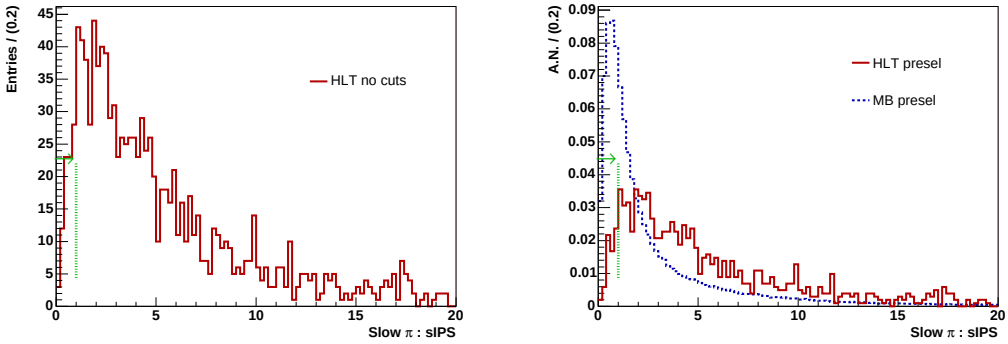

Figure 125: D*, smallest impact paratemeter significance sIPS of slow π.

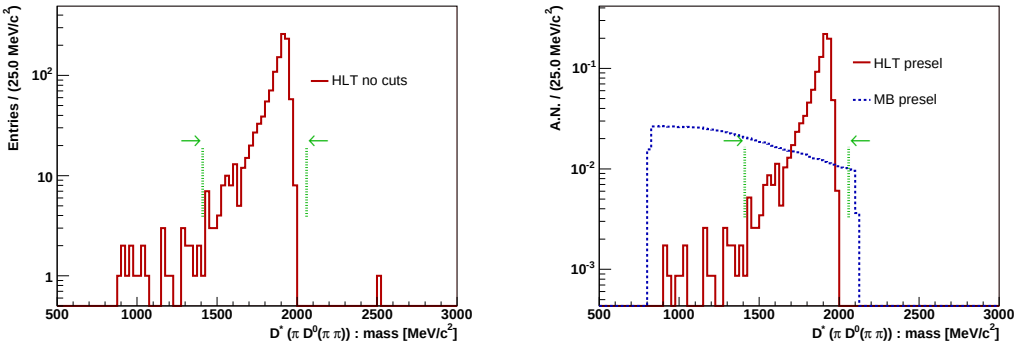

Figure 126: D*, invariant mass *m* of D* [MeV/c^2].

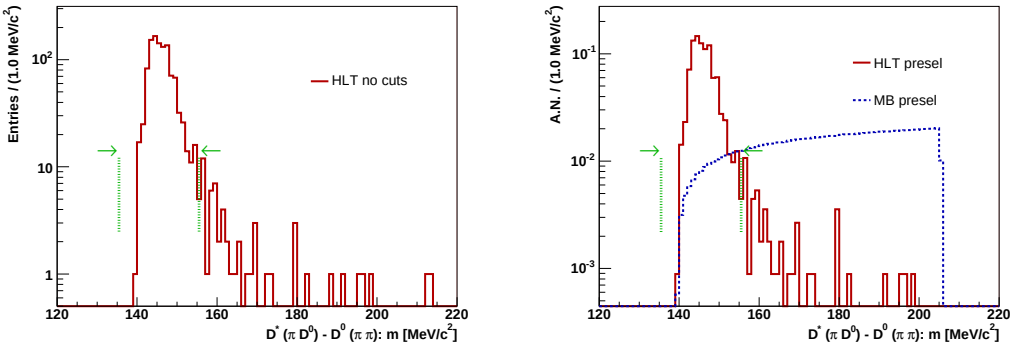

Figure 127: D^*, mass difference $m(D^*) - m(D^0)$ [MeV/c^2].

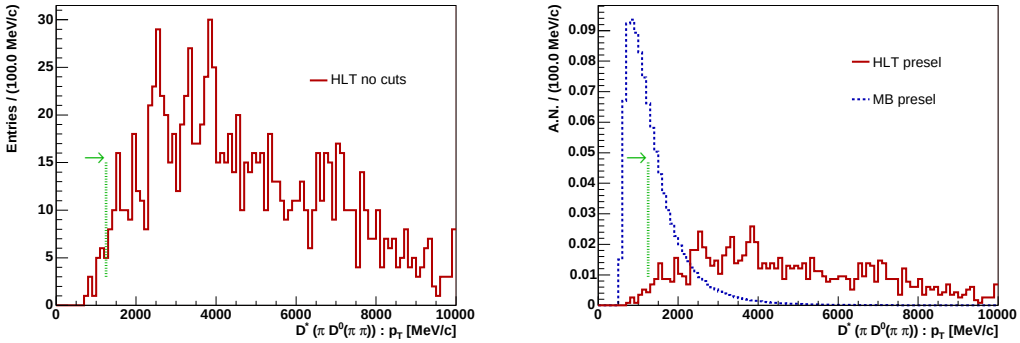

Figure 128: D^*, transverse momentum p_T of D^* [MeV/c].

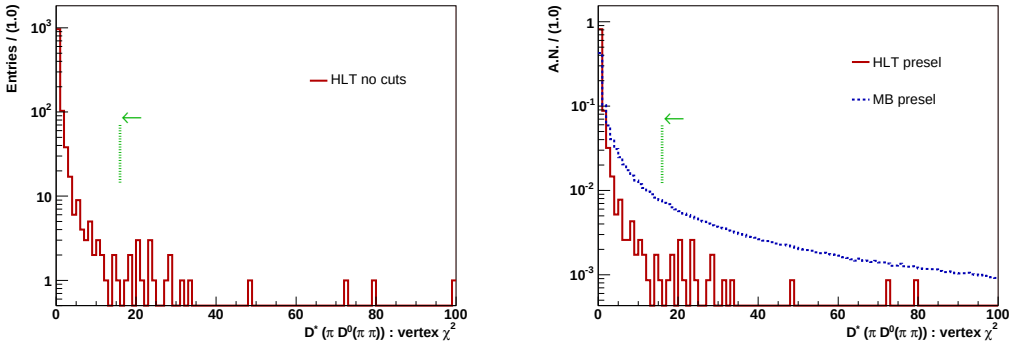

Figure 129: D^*, χ^2 of D^* vertex.

References

[1] LUIS FERNÁNDEZ AND PATRICK KOPPENBURG. Exclusive HLT Performance. LHCb-2005-047, LPHE-2005-015, 2005.