Supplemental Material for "Absolute measurements of branching fractions of Cabibbo-suppressed hadronic $D^{0(+)}$ decays involving multiple pions"

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Figures 1 to 8 show comparisons between data and MC simulations for the distributions of invariant mass spectra of two-, three-, four- or five-body particle combinations, momenta and cos θ of daughter particles for the signal DT candidates with more than 100 signal events. The candidates must satisfy additional requirements of $|M_{\rm BC}^{\rm tag(sig)} - M_D| < 0.006$ GeV/c^2 and multiple possible combinations of daughter particles are all plotted when relevant (e.g., all four $\pi^+\pi^-$ combinations for $D^0 \to 2\pi^+2\pi^-\pi^0$, etc.)

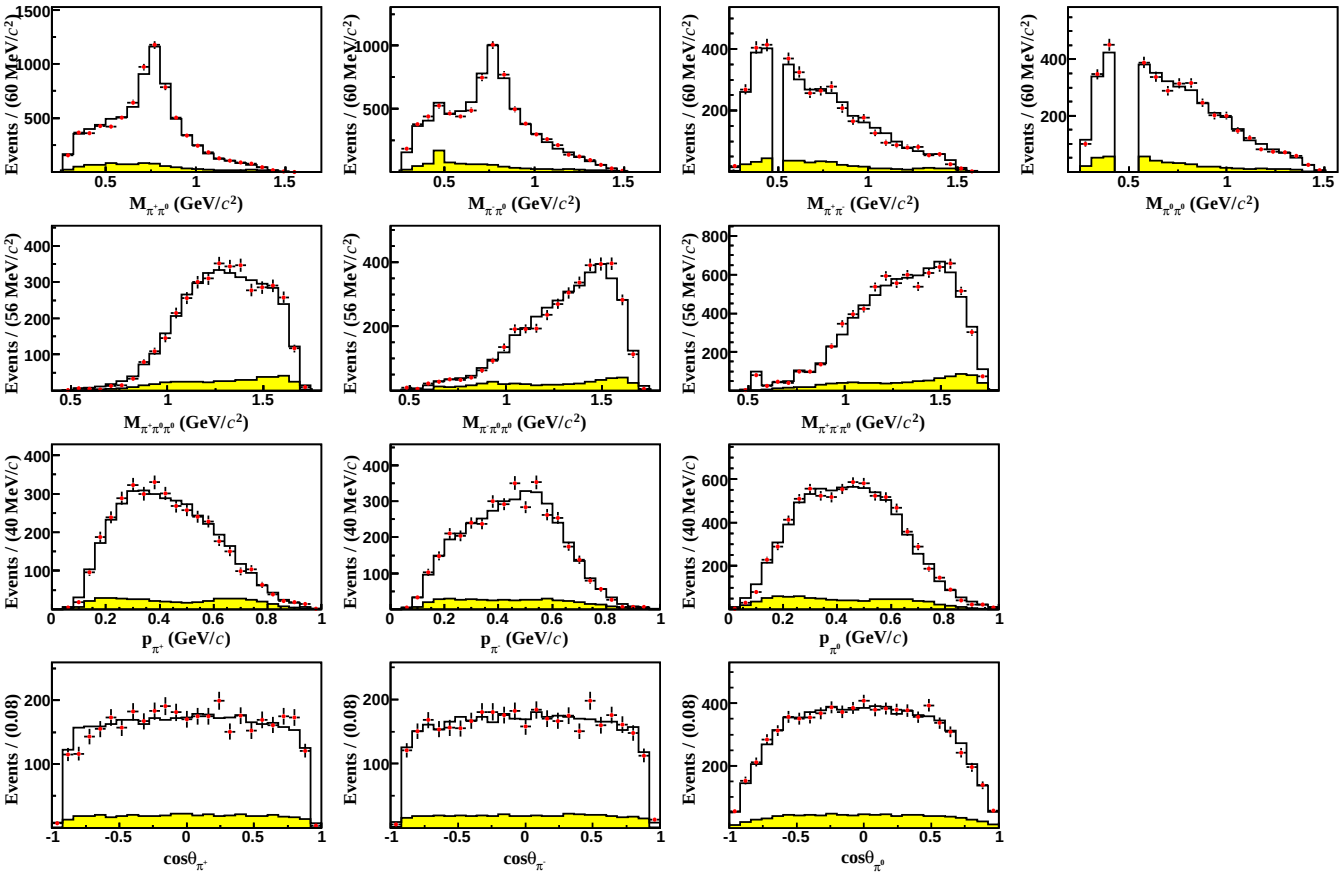

Fig. 1. Comparisons of the distributions of invariant masses of two- or three-body particle combinations, momenta and cos θ of daughter particles for the $D^0 \to \pi^+\pi^-2\pi^0$ candidates between data (points with error bars) and the mixing signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

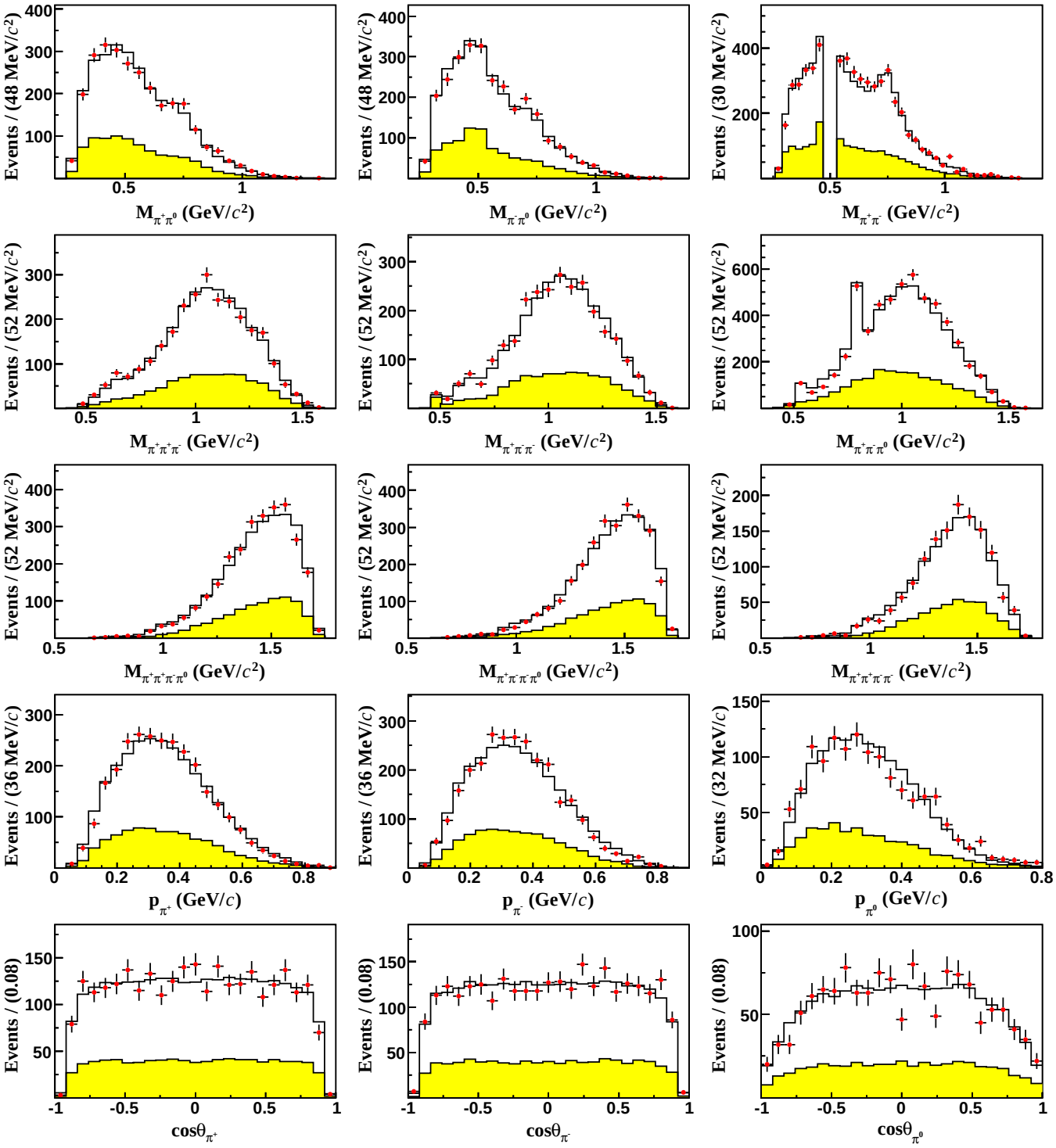

Fig. 2. Comparisons of the distributions of invariant masses of two-, three-, or four-body particle combinations, momenta and cos θ of daughter particles for the $D^0 \to 2\pi^+2\pi^-\pi^0$ candidates between data (points with error bars) and the mixing signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

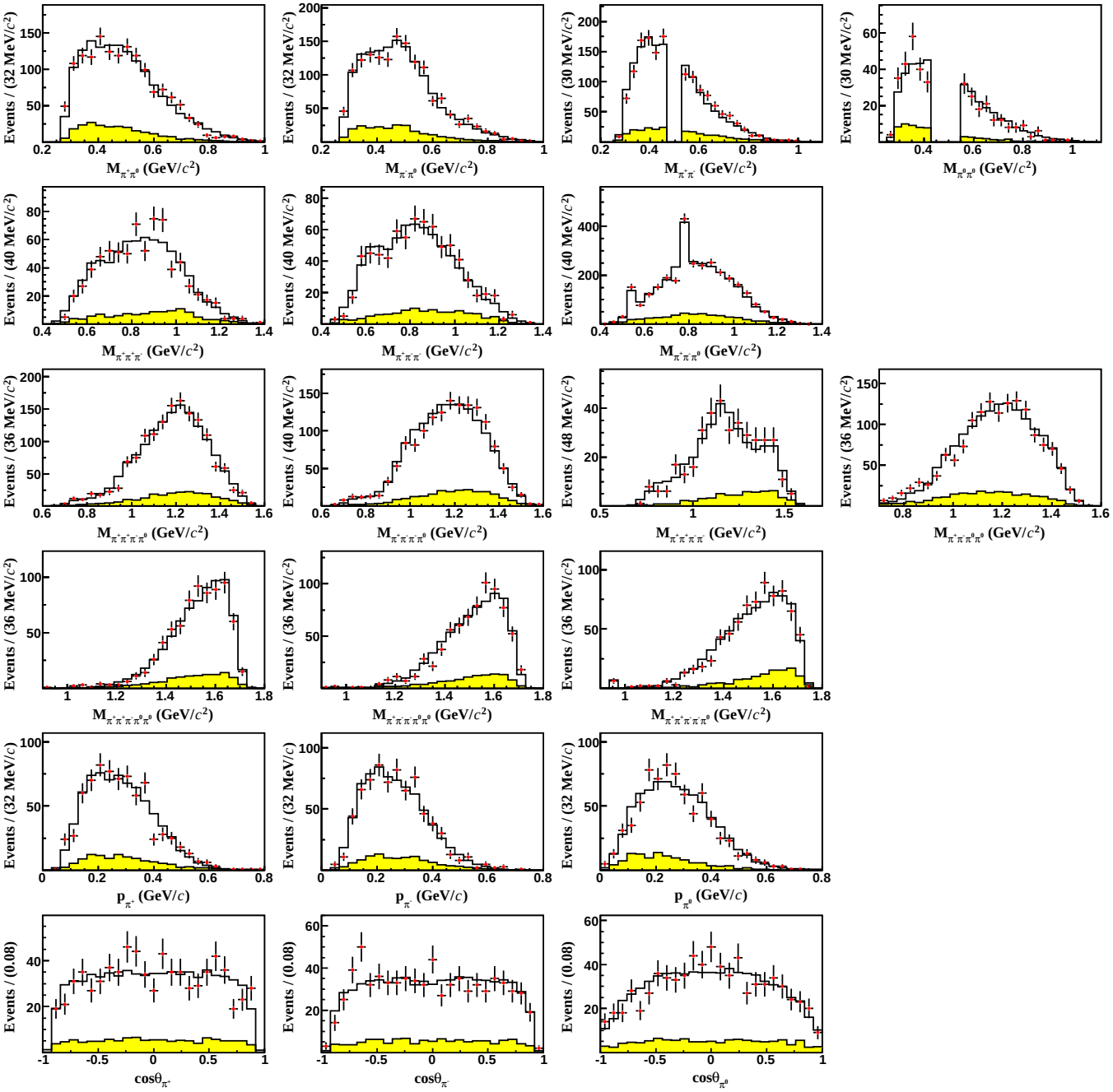

Fig. 3. Comparisons of the distributions of invariant masses of two-, three-, four- or five-body particle combinations, momenta and cos θ of daughter particles for the $D^0 \to 2\pi^+2\pi^-2\pi^0$ candidates between data (points with error bars) and the mixing signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

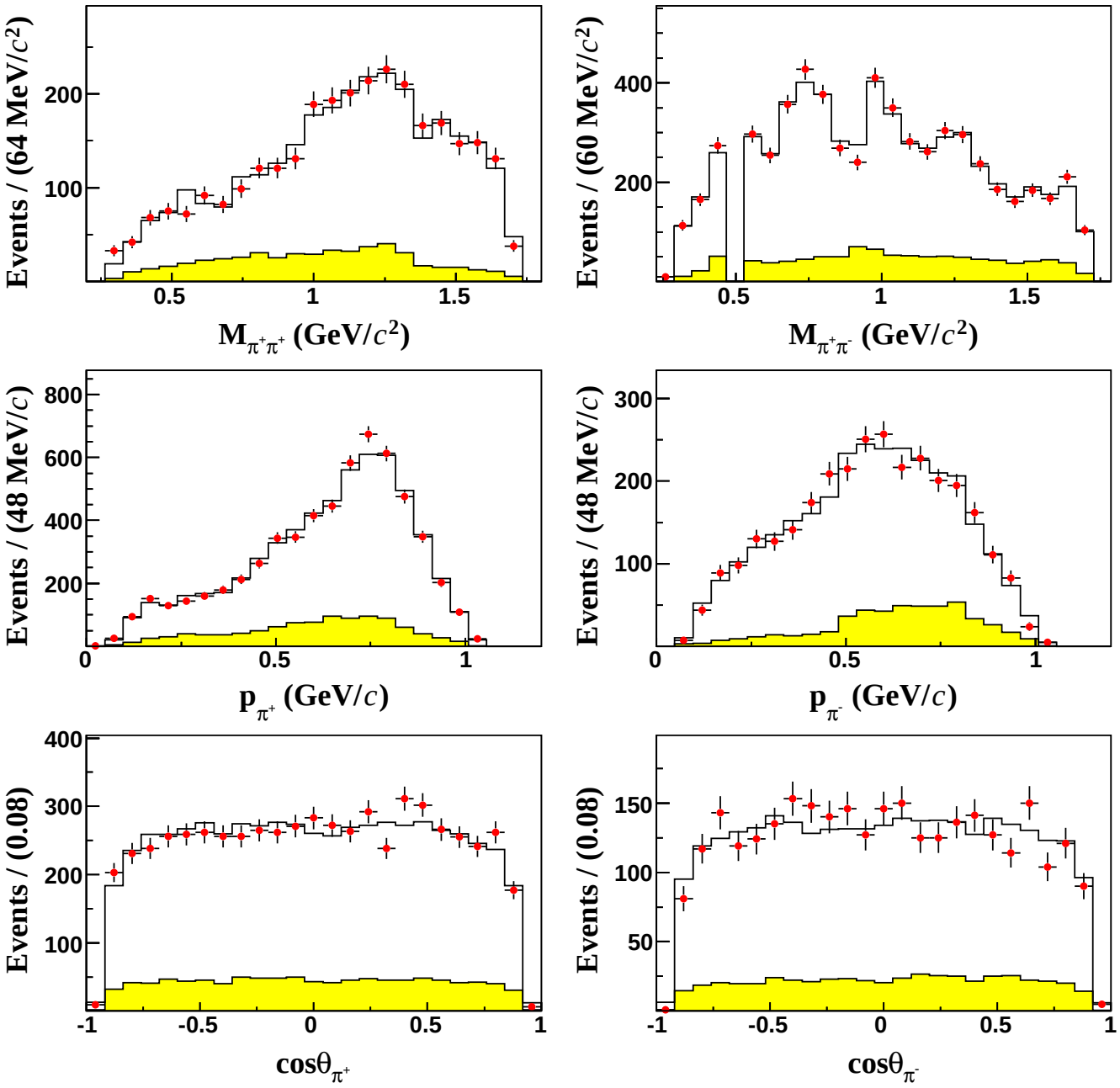

Fig. 4. Comparisons of the distributions of invariant masses of two-body particle combinations, momenta and cos θ of daughter particles for the $D^+ \to 2\pi^+\pi^-$ candidates between data (points with error bars) and the BODY3 signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

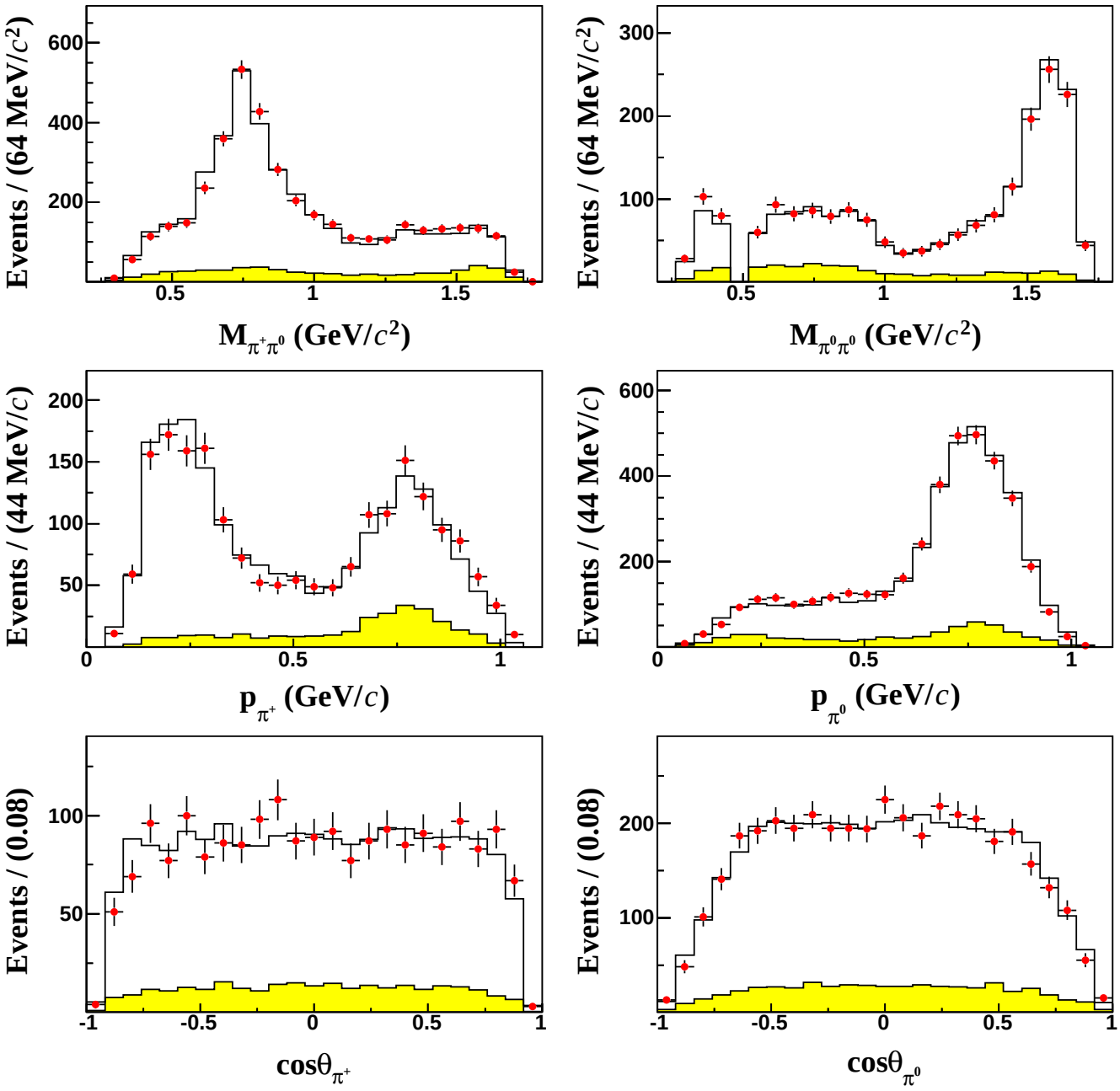

Fig. 5. Comparisons of the distributions of invariant masses of two-body particle combinations, momenta and cos θ of daughter particles for the $D^+ \to \pi^+ 2\pi^0$ candidates between data (points with error bars) and the BODY3 signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

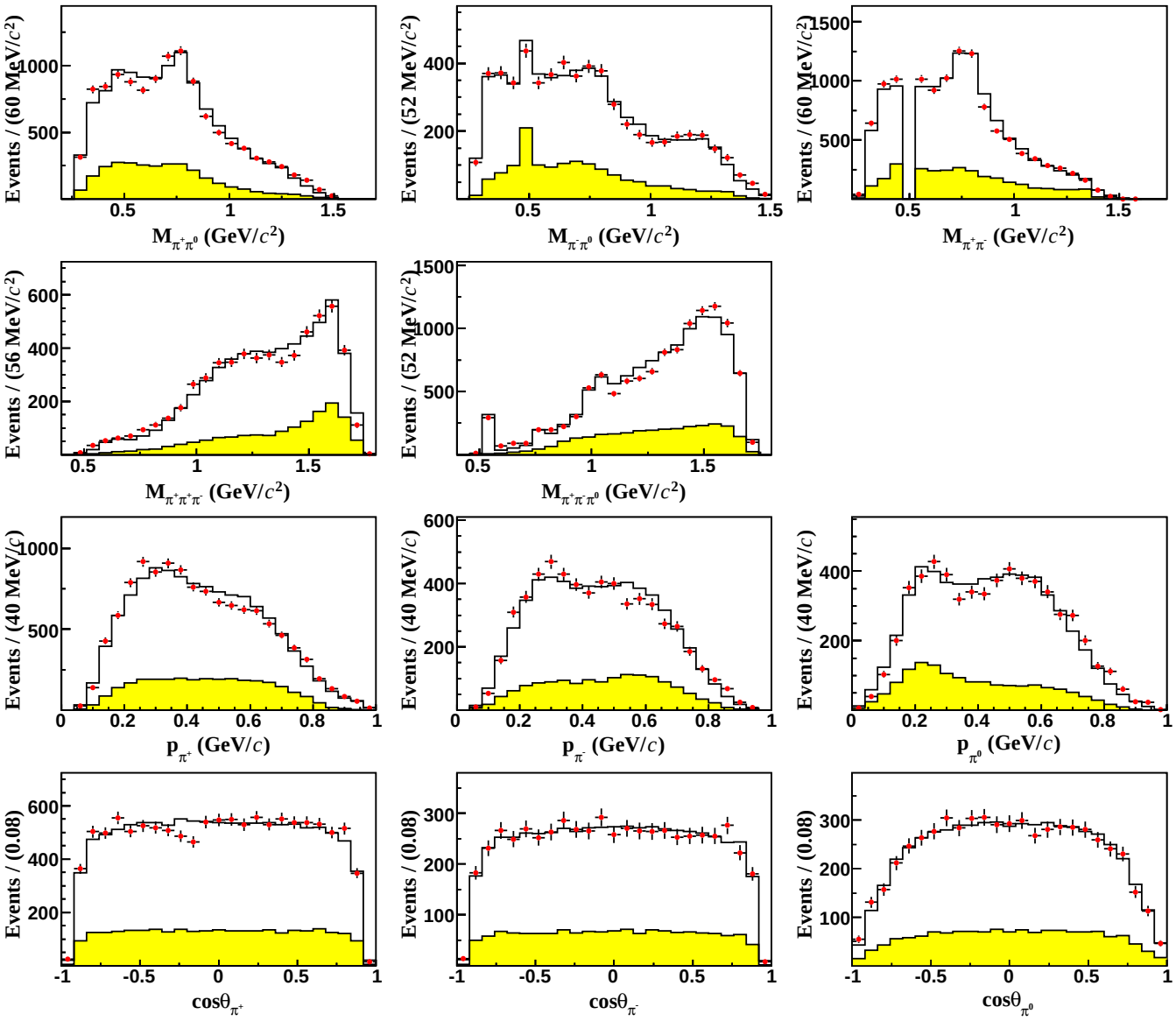

Fig. 6. Comparisons of the distributions of invariant masses of two- or three-body particle combinations, momenta and cos θ of daughter particles for the $D^+ \to 2\pi^+\pi^-\pi^0$ candidates between data (points with error bars) and the mixing signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

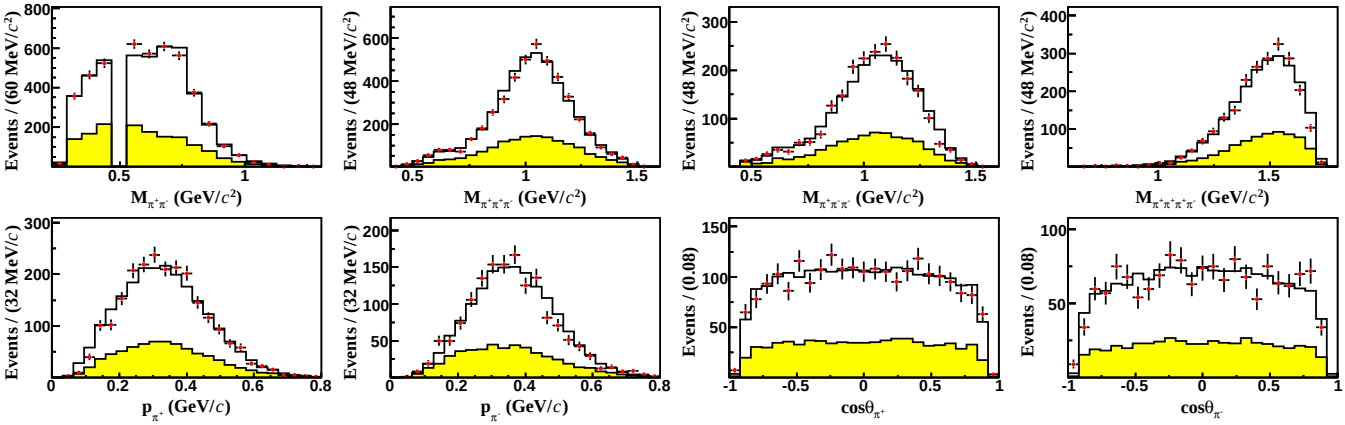

Fig. 7. Comparisons of the distributions of invariant masses of two- ,three- or four-body particle combinations, momenta and $\cos\theta$ of daughter particles for the $D^+ \to 3\pi^+2\pi^-$ candidates between data (points with error bars) and the mixing signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).

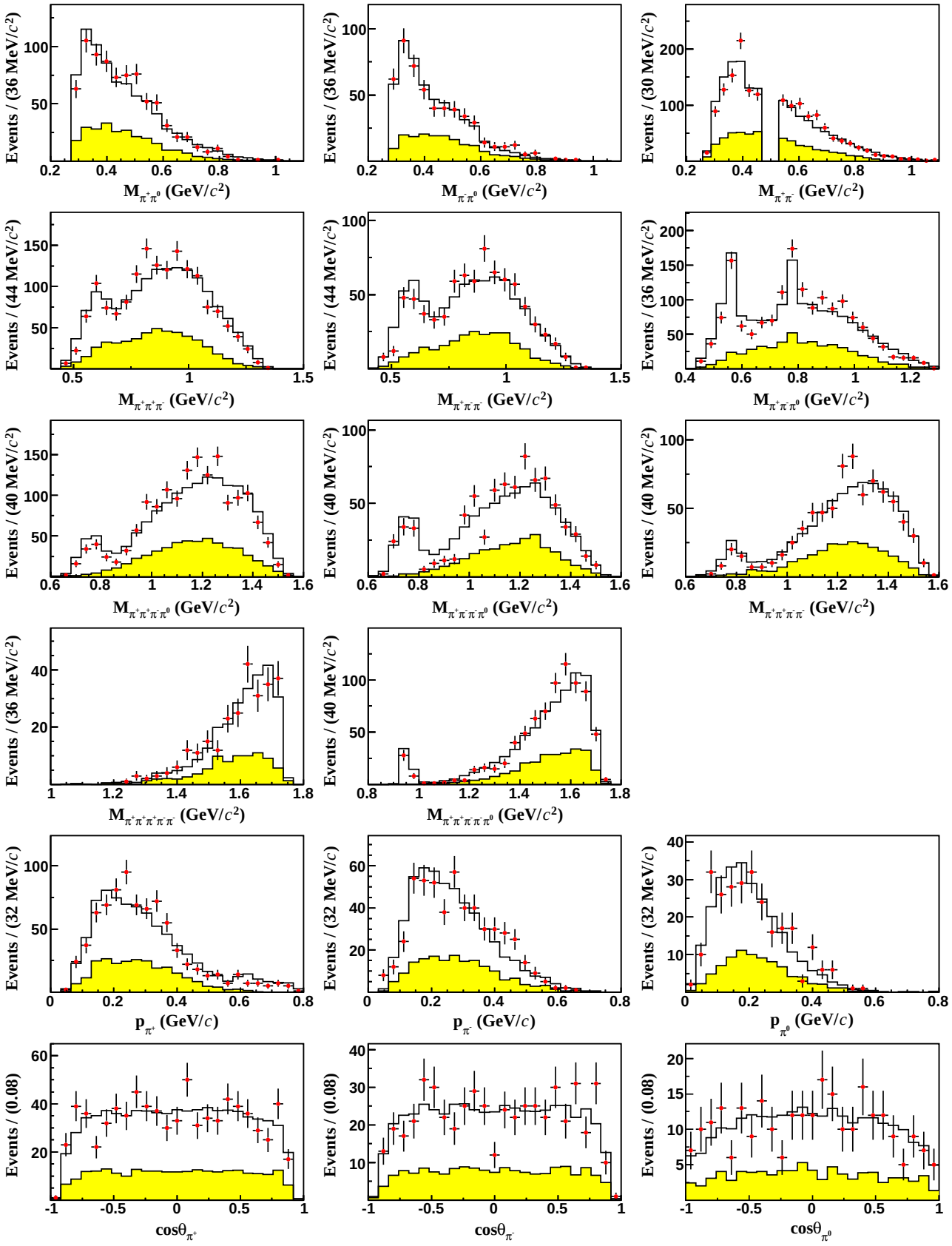

Fig. 8. Comparisons of the distributions of invariant masses of two-, three-, four- or five-body particle combinations, momenta and $\cos\theta$ of daughter particles for the $D^+ \to 3\pi^+2\pi^-\pi^0$ candidates between data (points with error bars) and the mixing signal MC events (black solid line histograms) plus the MC-simulated backgrounds from the inclusive MC sample (yellow filled histograms).