ArgonCube 2x2 Physics Study

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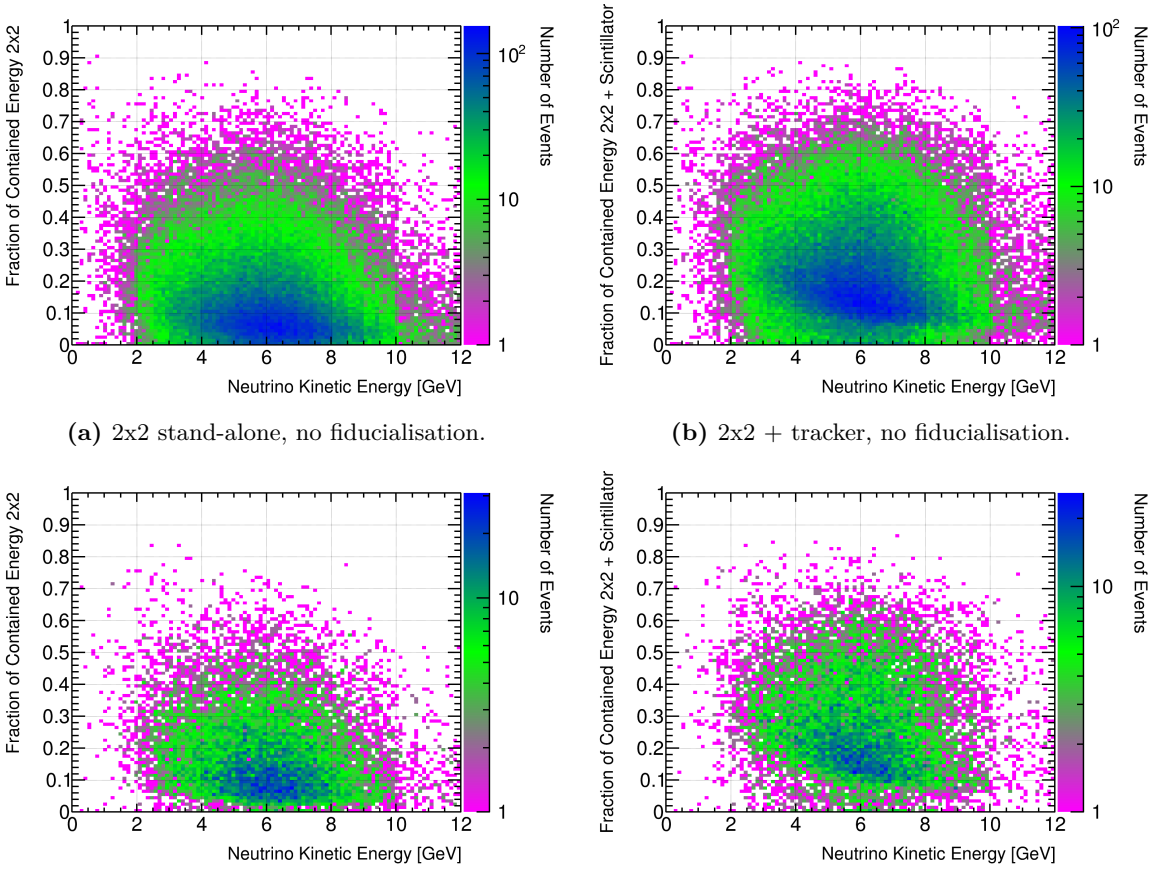
0.1 Introduction

Neutrino-event



(a) 2x2 stand-alone, no fiducialisation.

(b) 2x2 + tracker, no fiducialisation.

(c) 2x2 stand-alone, vertex in fiducial volume.

(d) 2x2 + tracker, vertex in fiducial volume.

Figure 1: Fraction of the parent neutrino kenetic energy deposited within the active detector volume.

EM Showers

π^0 Showers

Proton Induced Showers

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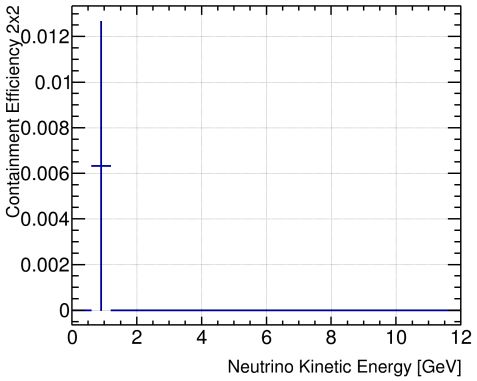
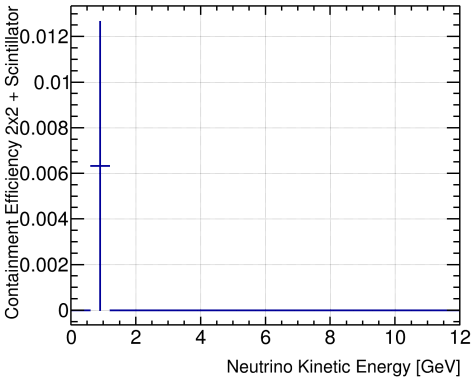
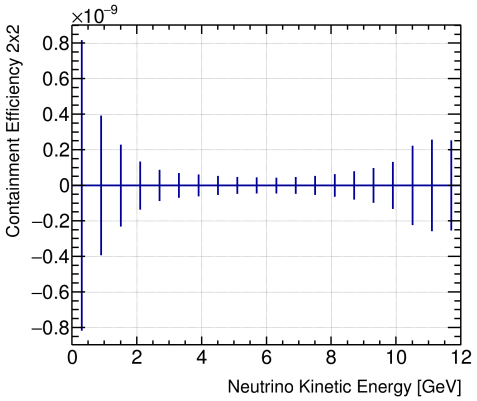


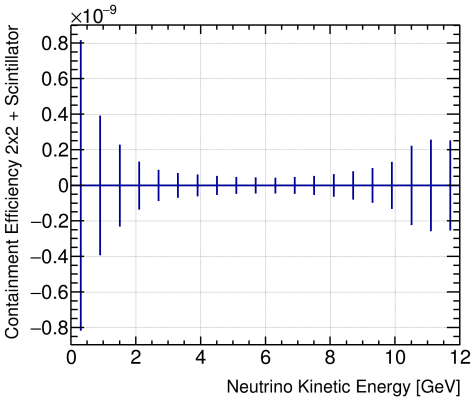
(a) 2x2 stand-alone, no fiducialisation.



(b) 2x2 + tracker, no fiducialisation.

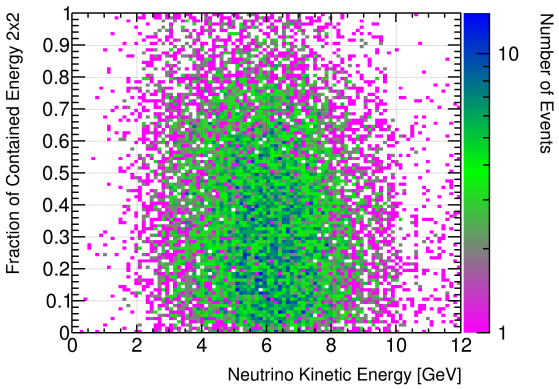


(c) 2x2 stand-alone, vertex in fiducial volume.

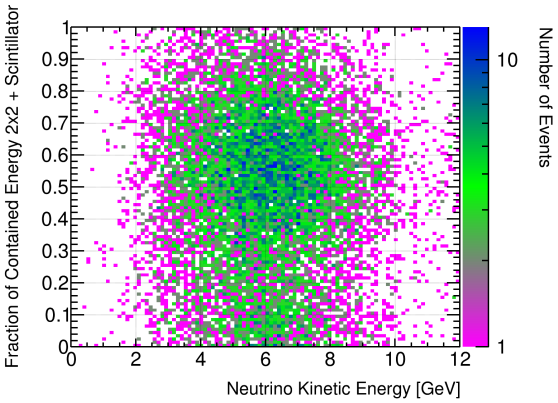


(d) 2x2 + tracker, vertex in fiducial volume.

Figure 2: Event-containment efficiency. An event is classed as contained if at least 90% of the parent neutrino kinetic energy is deposited within the active detector volume.

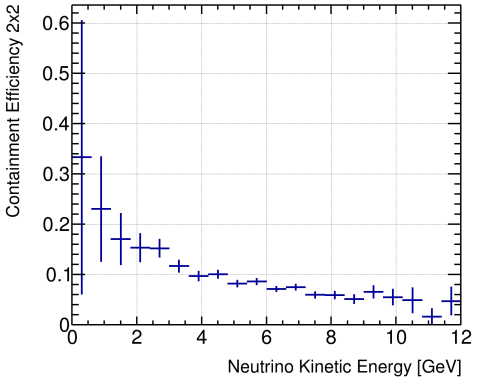


(a) 2x2 stand-alone, vertex in fiducial volume, muon energies ignored.

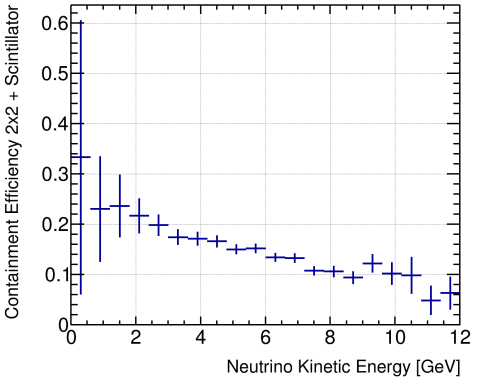


(b) 2x2 + tracker, vertex in fiducial volume, muon energies ignored.

Figure 3: Fraction of the parent neutrino kenetic energy deposited within the active detector volume.

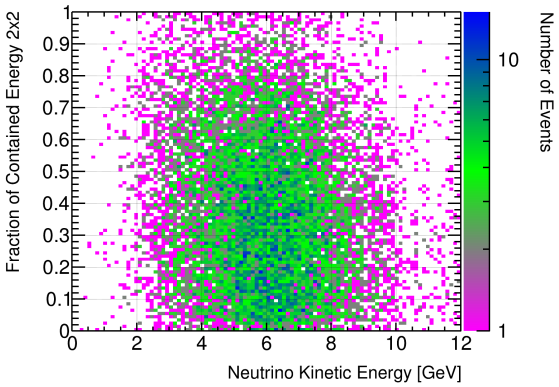


(a) 2x2 stand-alone, vertex in fiducial volume, muon energies ignored.

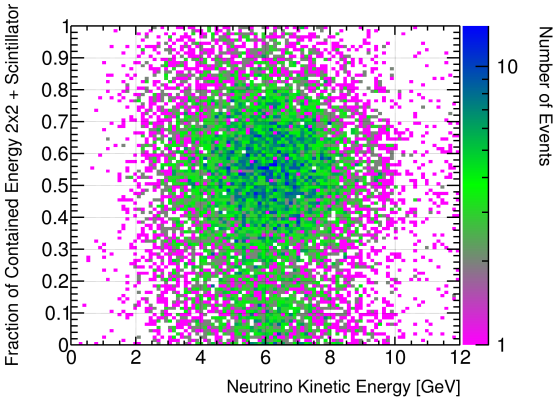


(b) 2x2 + tracker, vertex in fiducial volume, muon energies ignored.

Figure 4: Event-containment efficiency. An event is classed as contained if at least 90% of the parent neutrino kinetic energy is deposited within the active detector volume.

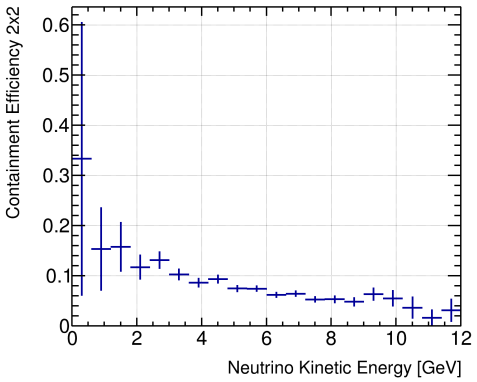


(a) 2x2 stand-alone, vertex in fiducial volume, primary muon energy ignored.

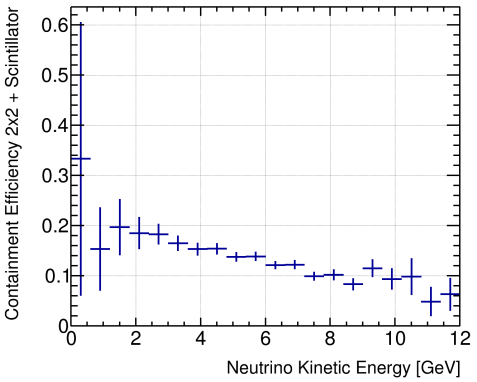


(b) 2x2 + tracker, vertex in fiducial volume, primary muon energy ignored.

Figure 5: Fraction of the parent neutrino kenetic energy deposited within the active detector volume.

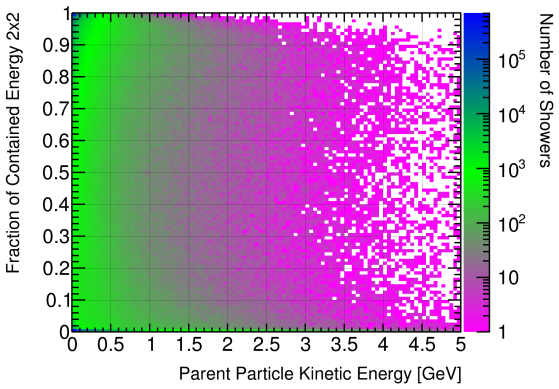


(a) 2x2 stand-alone, vertex in fiducial volume, primary muon energy ignored.

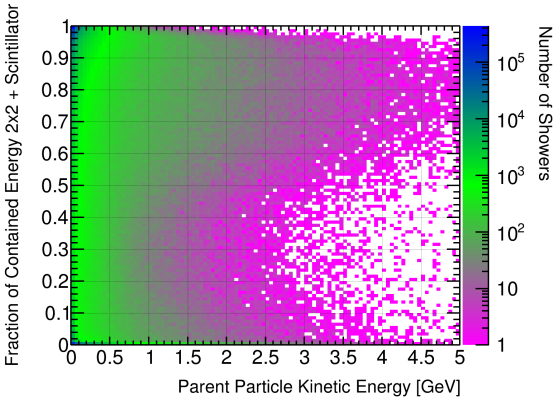


(b) 2x2 + tracker, vertex in fiducial volume, primary muon energy ignored.

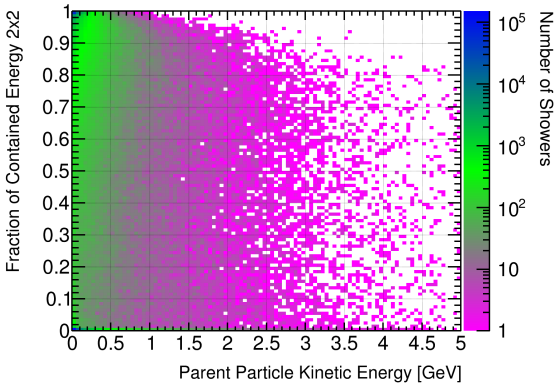
Figure 6: Event-containment efficiency. An event is classed as contained if at least 90% of the parent neutrino kinetic energy is deposited within the active detector volume.



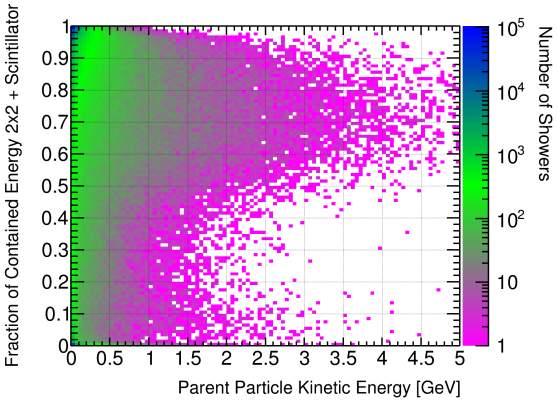
(a) 2x2 stand-alone, no fiducialisation.



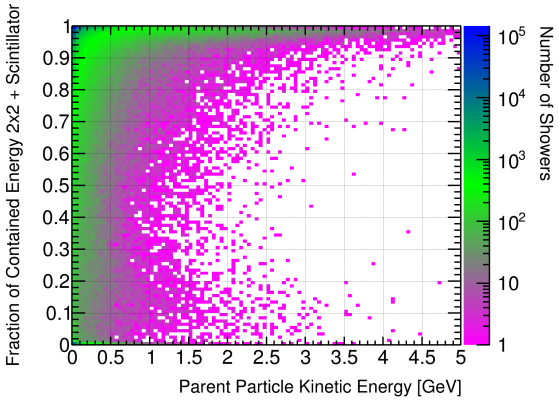
(b) 2x2 + tracker, no fiducialisation.



(c) 2x2 stand-alone, vertex in fiducial volume.

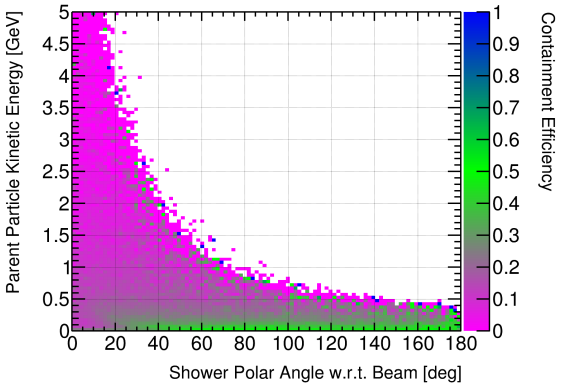


(d) 2x2 + tracker, vertex in fiducial volume.

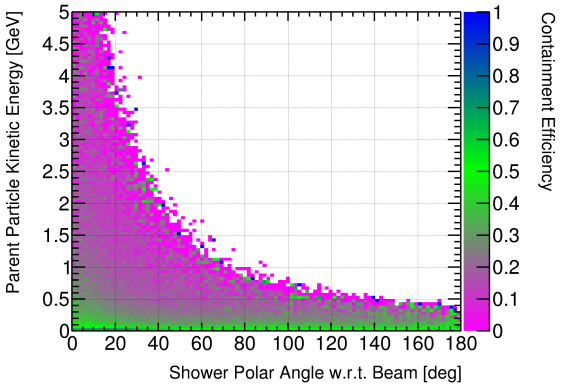


(e) 2x2 + tracker no gap, vertex in fiducial volume.

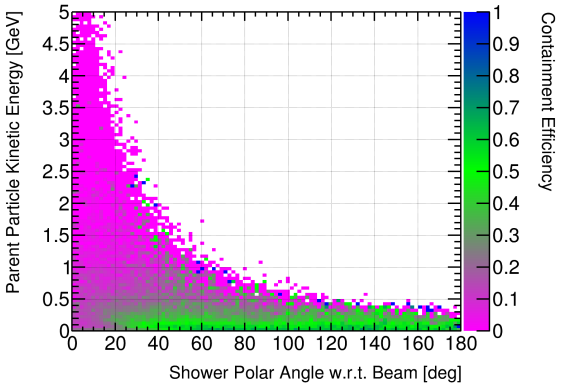
Figure 7: Fraction of kinetic shower energy ($e^{\pm}$ mass ignored) deposited within the active detector volume.



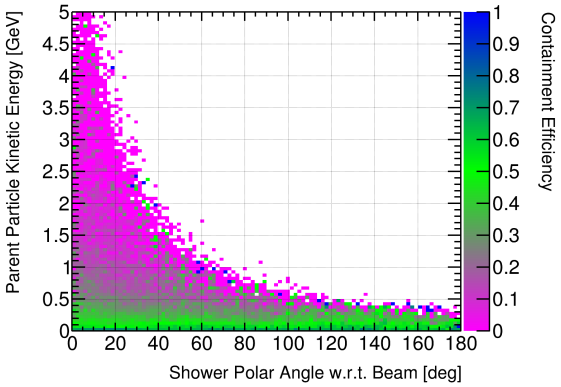
(a) 2x2 stand-alone, no fiducialisation.



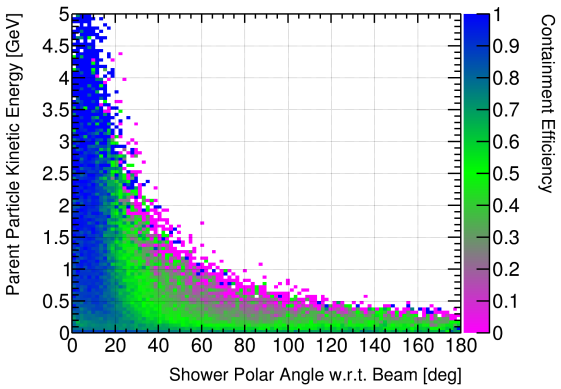
(b) 2x2 + tracker, no fiducialisation.



(c) 2x2 stand-alone, vertex in fiducial volume.

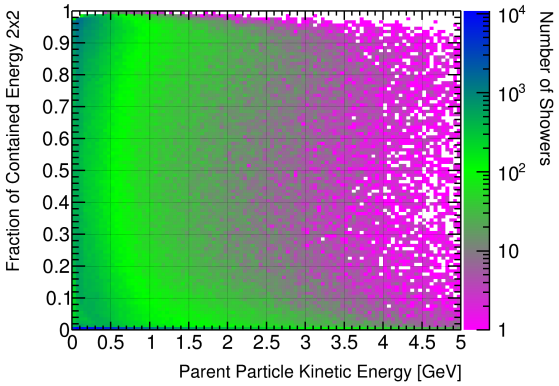


(d) 2x2 + tracker, vertex in fiducial volume.

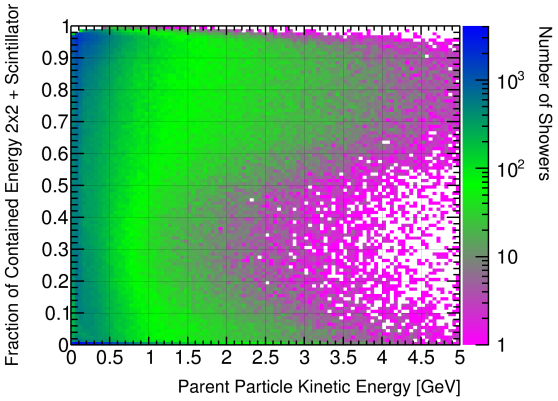


(e) 2x2 + tracker no gap, vertex in fiducial volume.

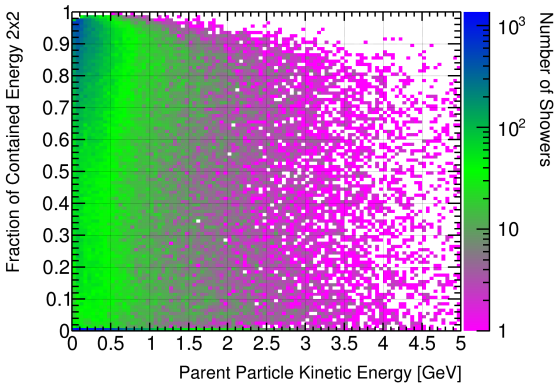
Figure 8: Shower-containment efficiency. A shower is classed as contained if at least 90% of the kinetic shower energy ($e^{\pm}$ mass ignored) is deposited within the active detector volume.



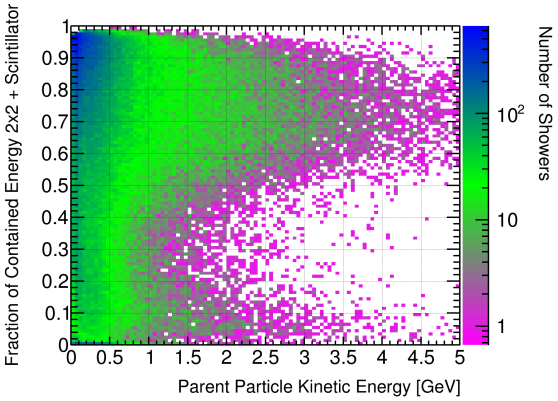
(a) 2x2 stand-alone, no fiducialisation.



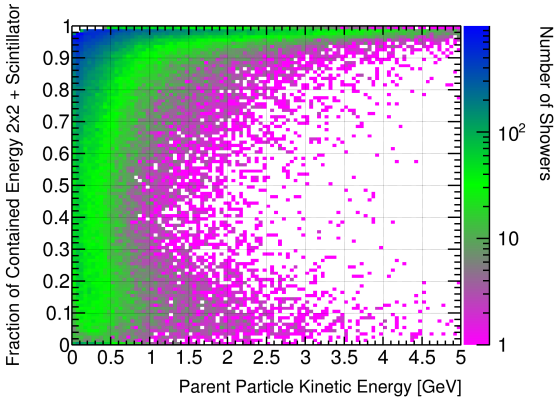
(b) 2x2 + tracker, no fiducialisation.



(c) 2x2 stand-alone, vertex in fiducial volume.

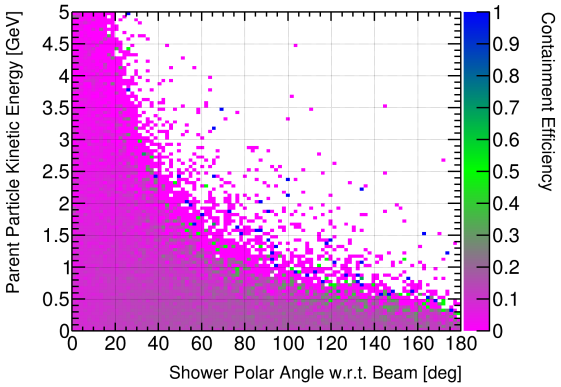


(d) 2x2 + tracker, vertex in fiducial volume.

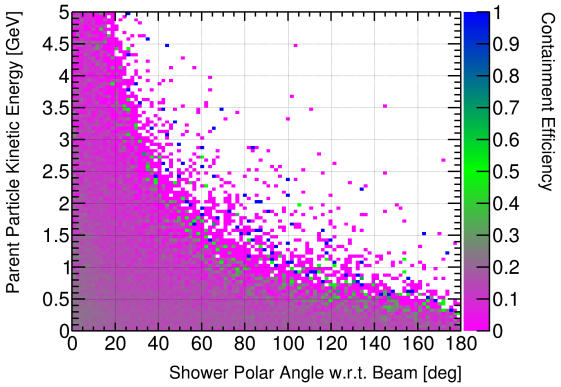


(e) 2x2 + tracker no gap, vertex in fiducial volume.

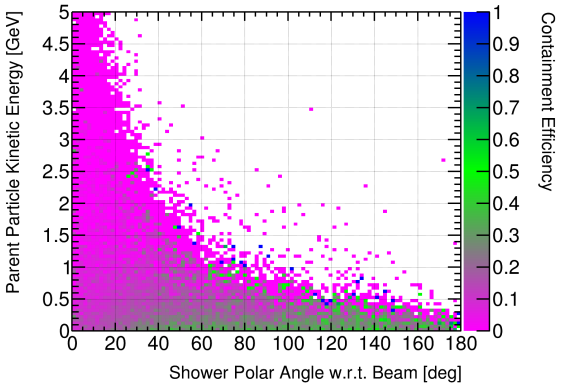
Figure 9: Fraction of total shower energy (including the π^0 mass) deposited within the active detector volume.



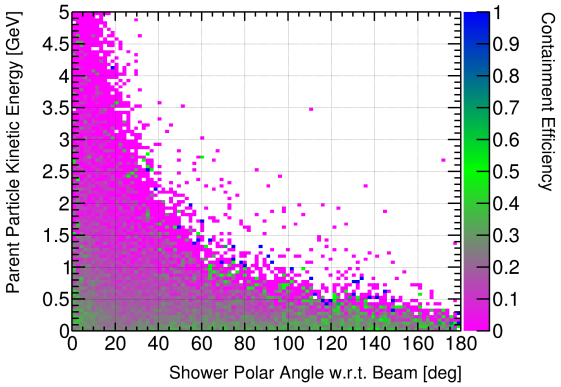
(a) 2x2 stand-alone, no fiducialisation.



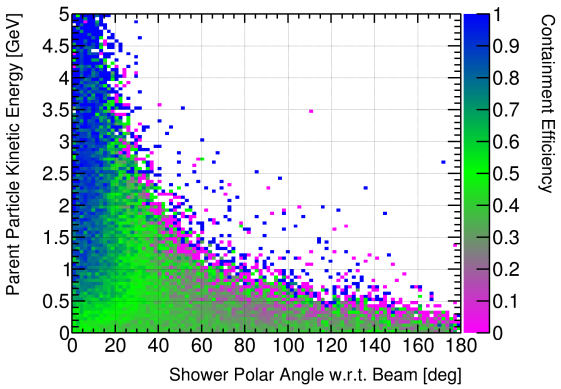
(b) 2x2 + tracker, no fiducialisation.



(c) 2x2 stand-alone, vertex in fiducial volume.

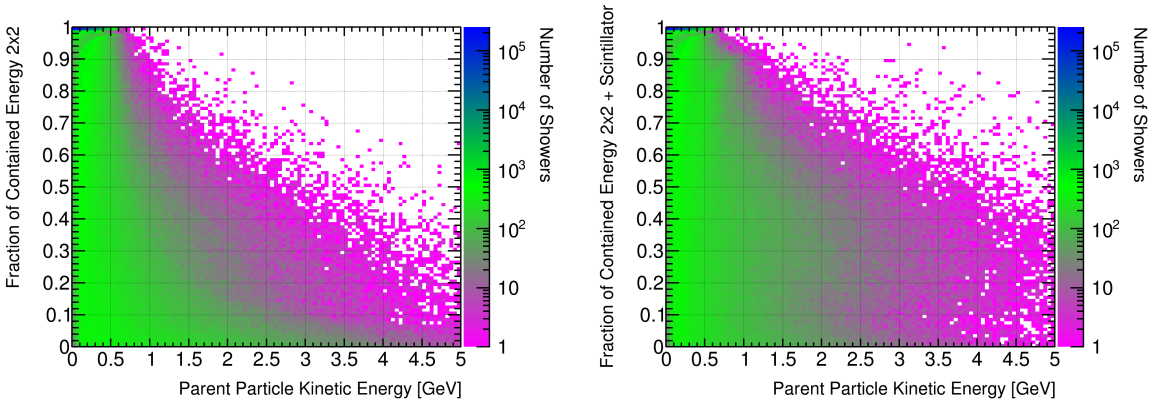


(d) 2x2 + tracker, vertex in fiducial volume.



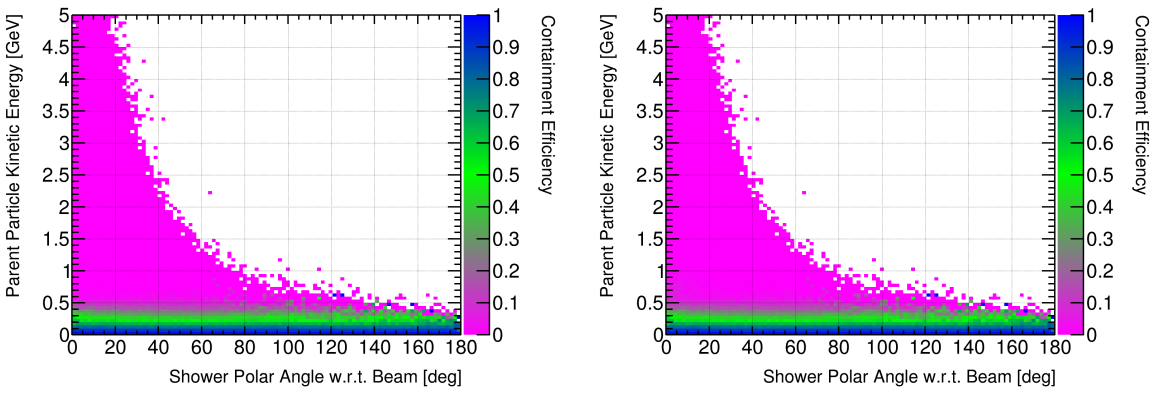
(e) 2x2 + tracker no gap, vertex in fiducial volume.

Figure 10: Shower-containment efficiency. A shower is classed as contained if at least 90% of the total shower energy (including the π^0 mass) is deposited within the active detector volume.



(a) 2x2 stand-alone, no fiducialisation. **(b)** 2x2 + tracker, no fiducialisation.

Figure 11: Fraction of initial proton kinetic energy deposited within the active detector volume.



(a) 2x2 stand-alone, no fiducialisation. **(b)** 2x2 + tracker, no fiducialisation.

Figure 12: Shower-containment efficiency. A shower is classed as contained if at least 90% of the initial proton kinetic energy is deposited within the active detector volume.