

FIGURE 37. A space in which the causality and past distinguishing conditions hold everywhere, but the future distinguishing condition does not hold at p or q (in fact, $I^+(p) = I^+(q)$). The light cones on the cylinder tip over until one null direction is horizontal, and then tip back up; a strip has been removed, thus breaking the closed null geodesic that would otherwise occur.

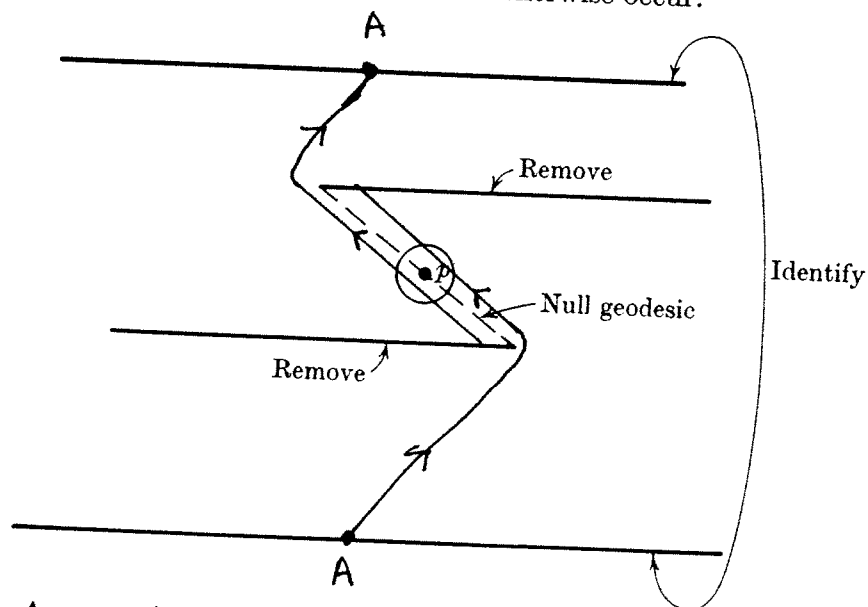


FIGURE 38. A space-time satisfying the causality, future and past distinguishing conditions, but not satisfying the strong causality condition at p . Two strips have been removed from a cylinder; light cones are at $\pm 45^\circ$.