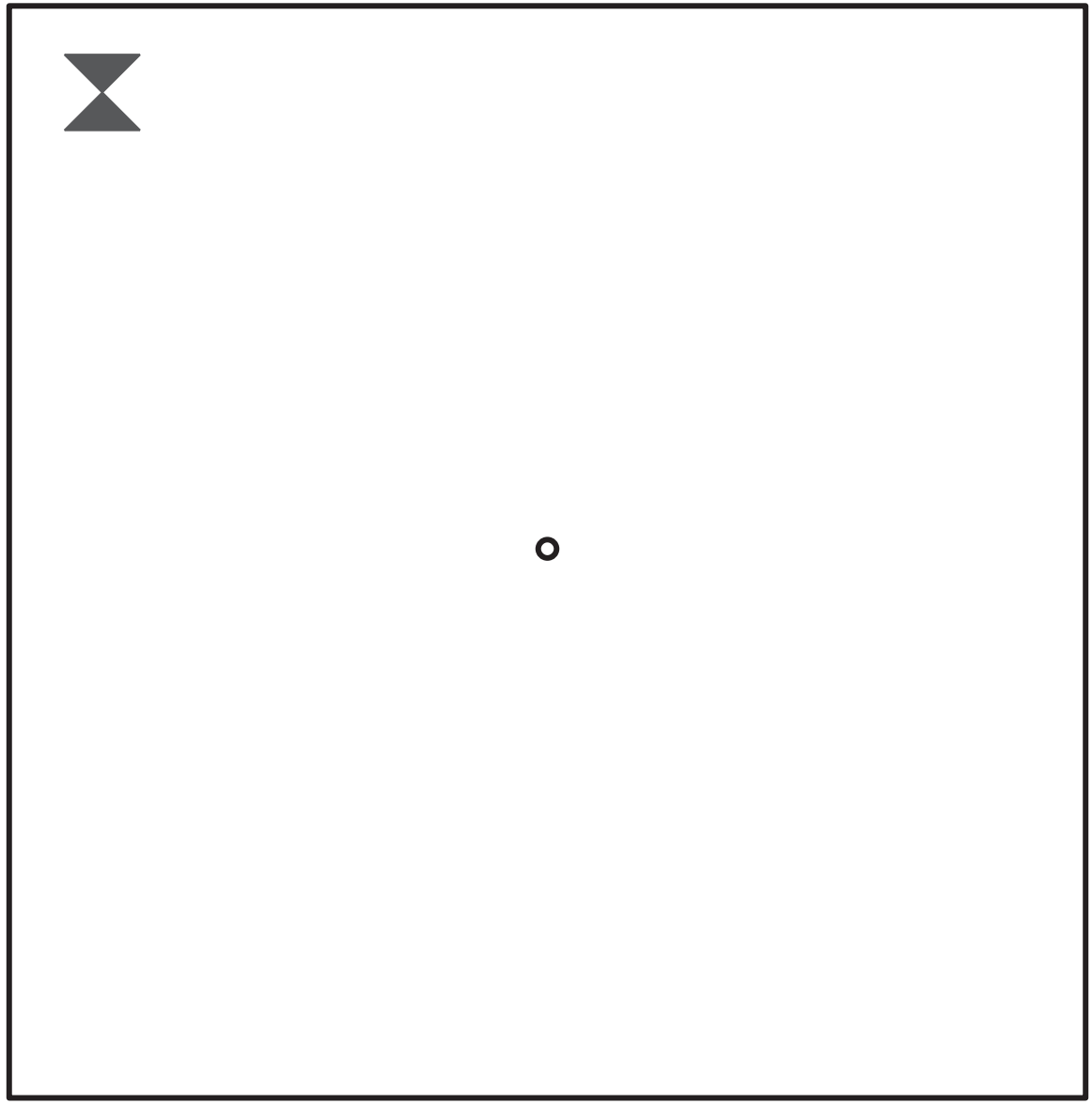
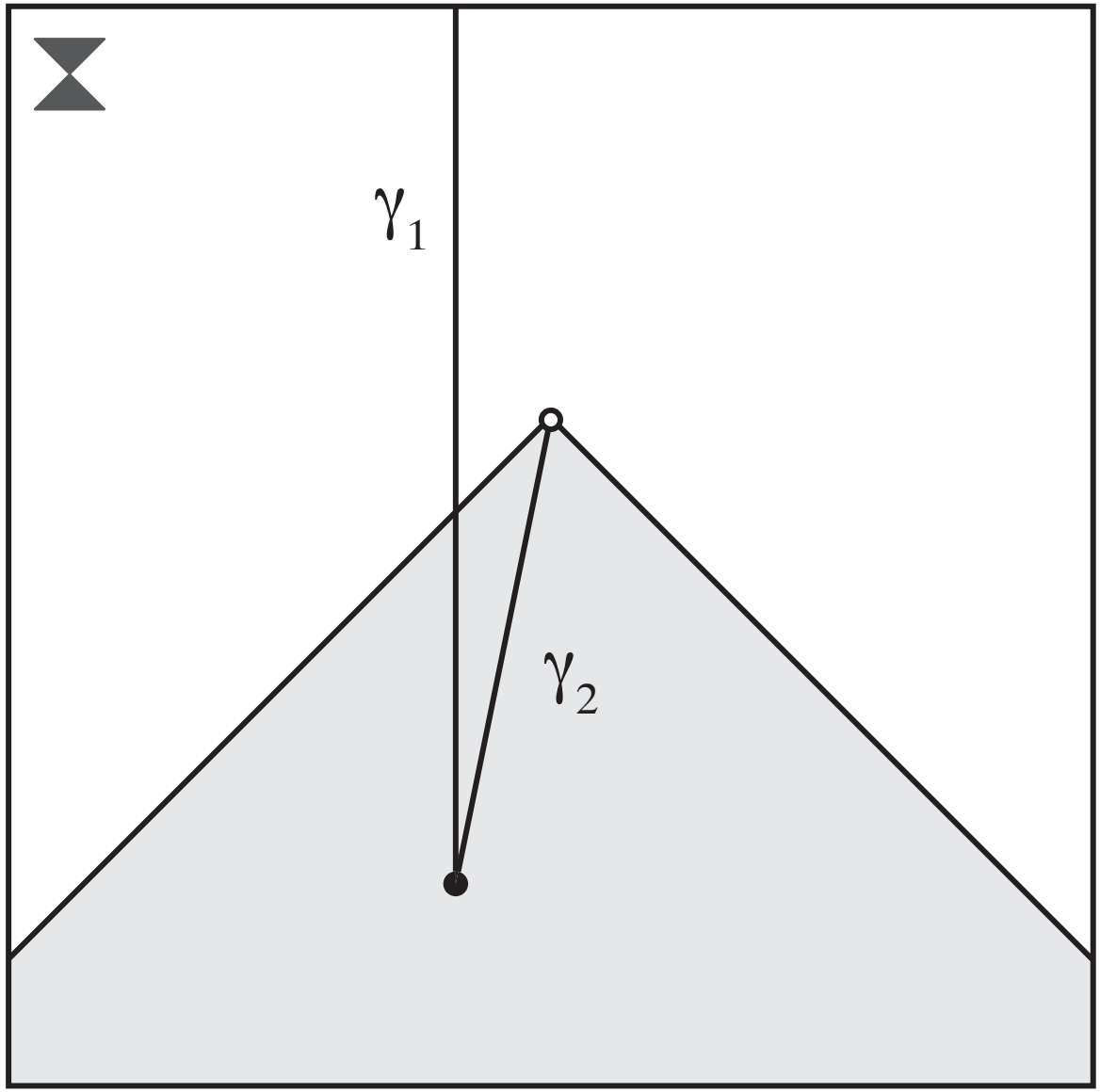
epistemic ‘holes’ in spacetime

john byron manchak

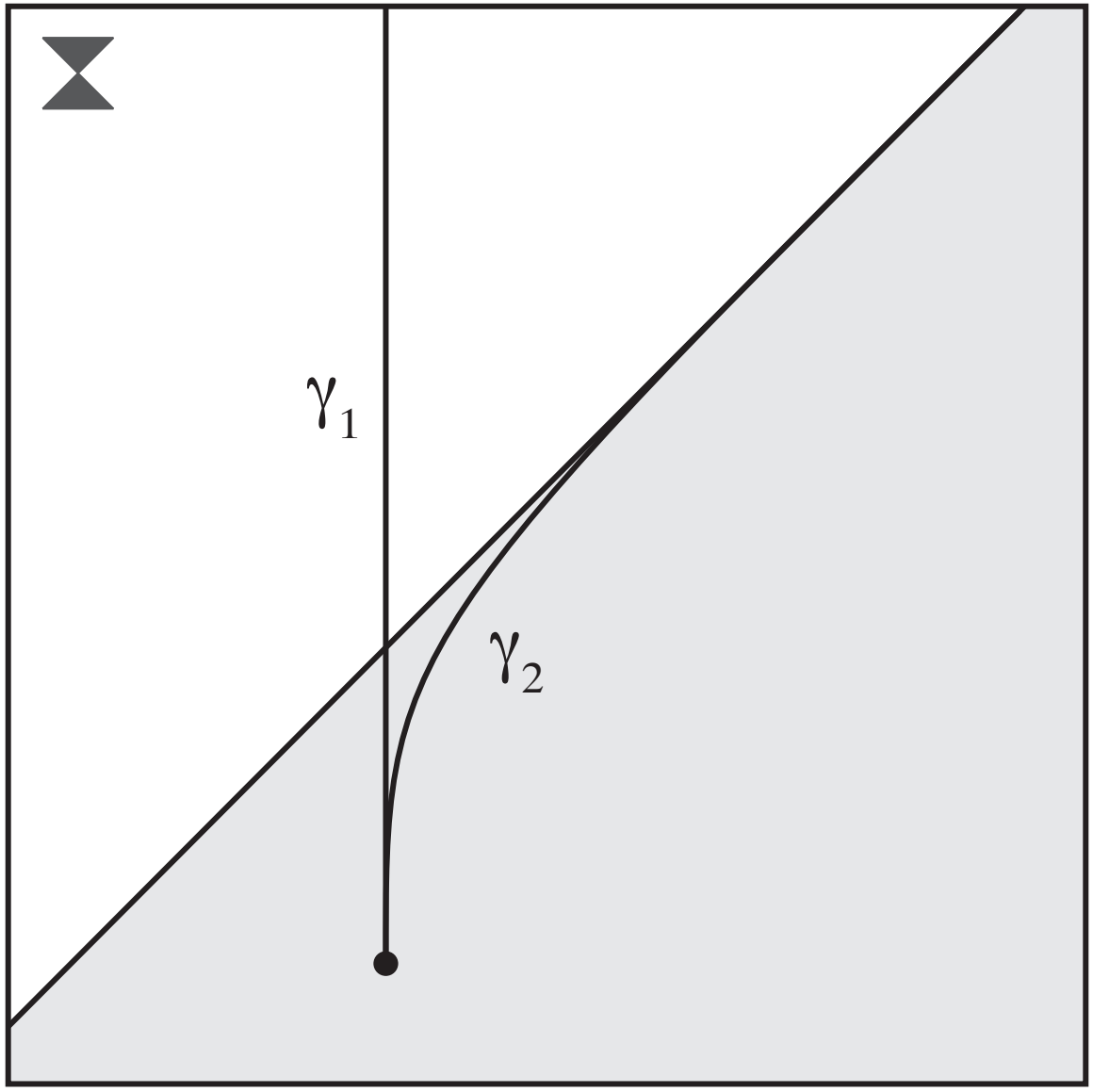


minkowski spacetime with a point removed

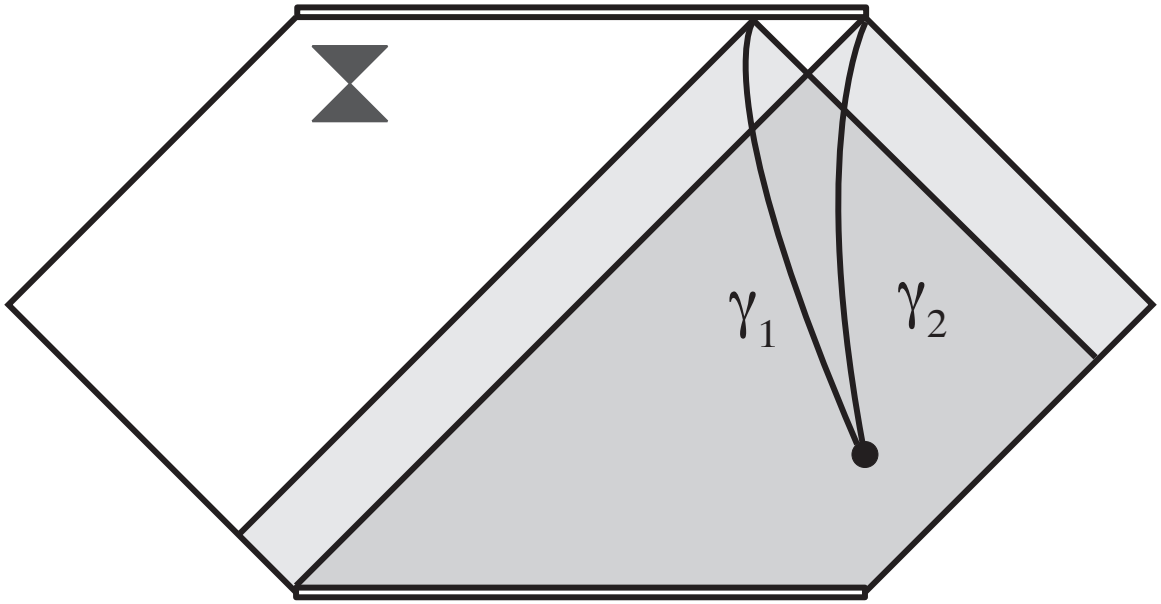
a spacetime has an **epistemic hole** if there are two future inextendible timelike geodesics with the same past endpoint such that the past light cone of one is a proper subset of the past light cone of the other.



an epistemic hole



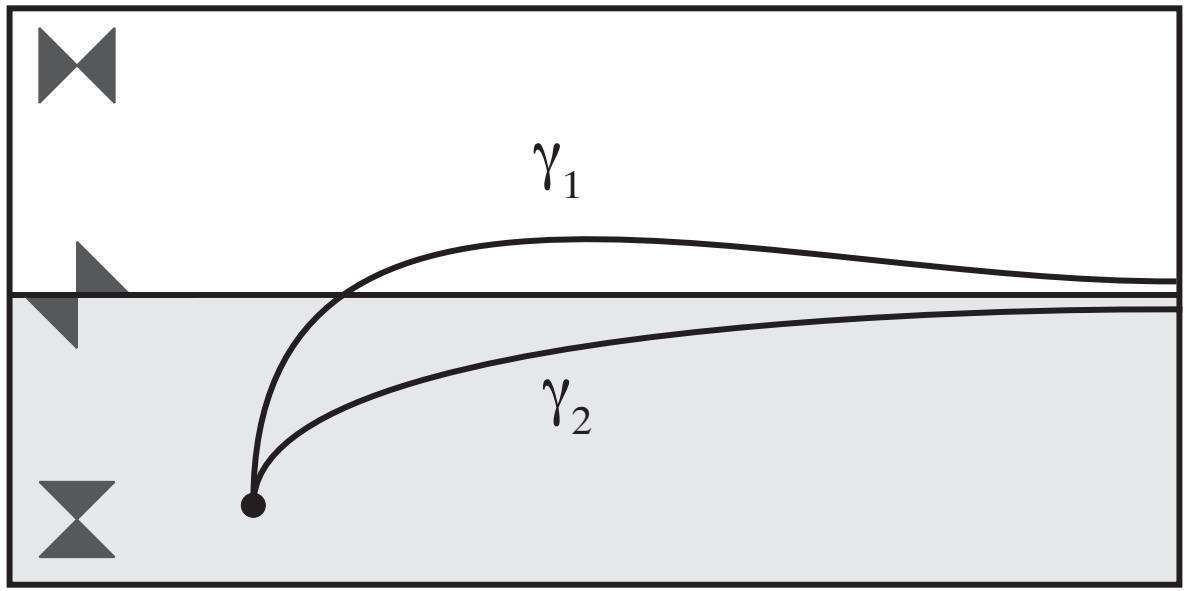
minkowski spacetime



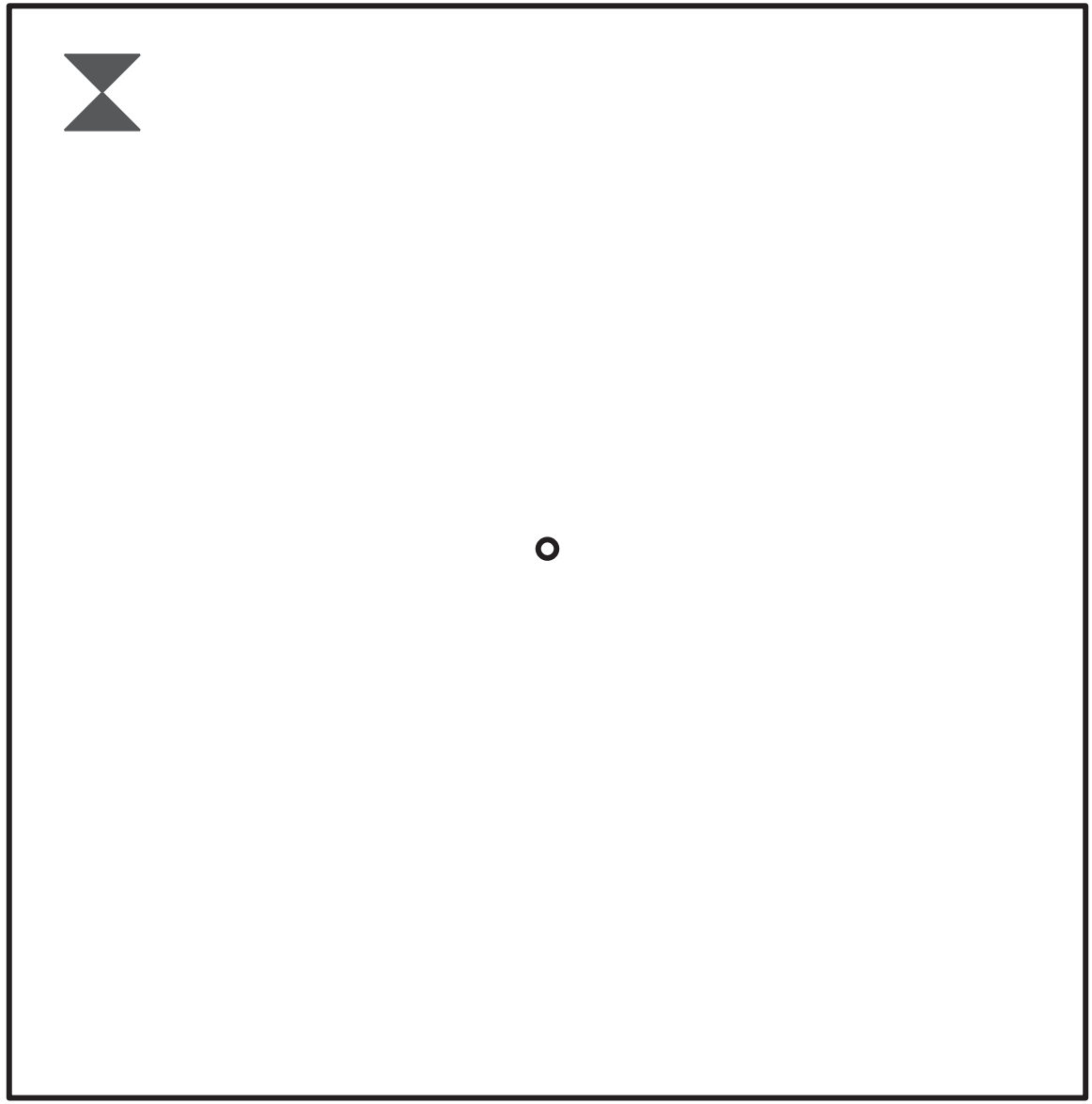
conformal diagram of kruskal-schwarzchild spacetime

epistemically hole-free spacetimes: minkowski, schwarzchild, de sitter, anti-de sitter, and gödel.

spacetimes with epistemic holes: any ‘causally well-behaved’ spacetime with one point removed from the manifold, and in addition, misner.



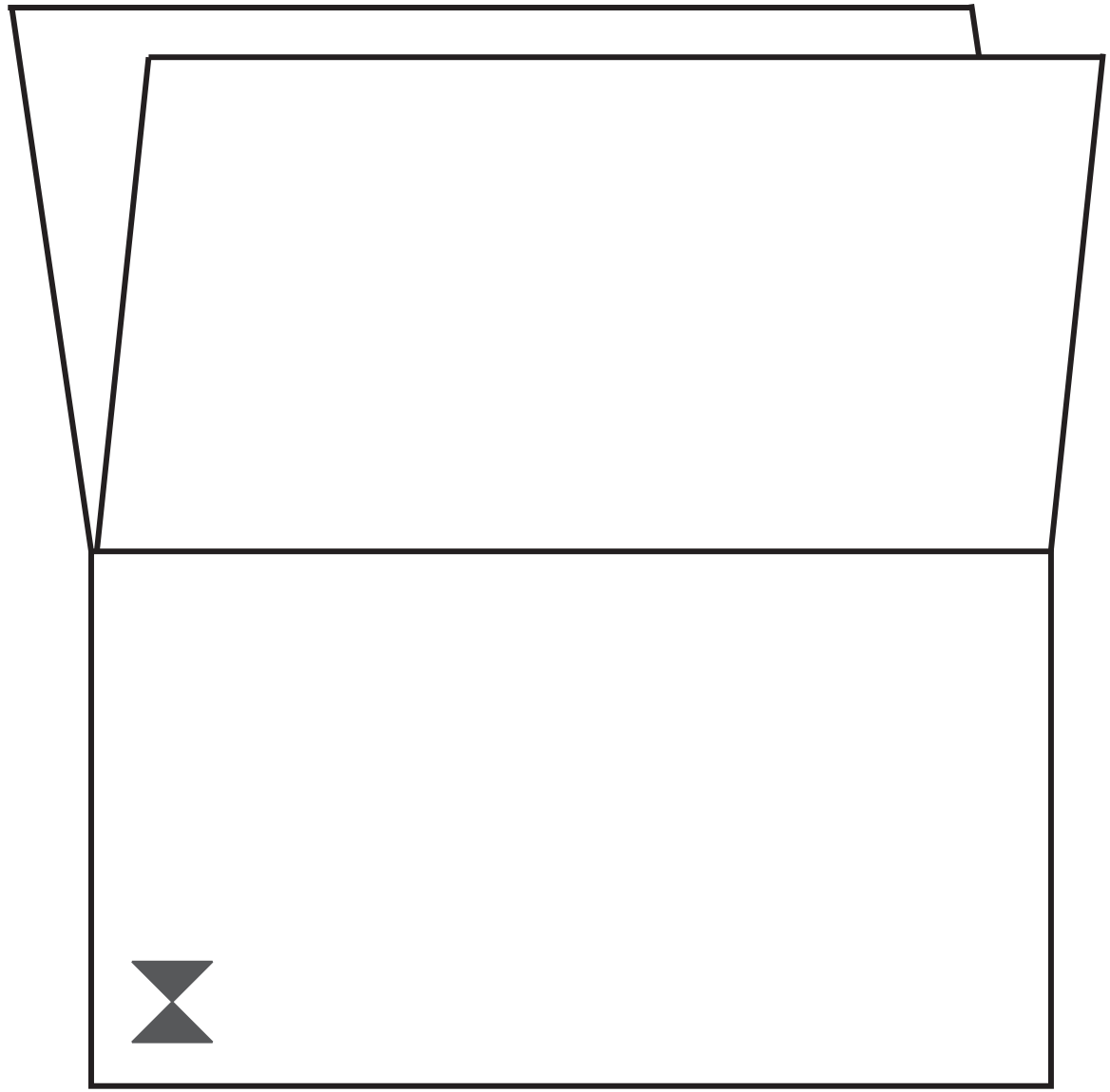
misner spacetime



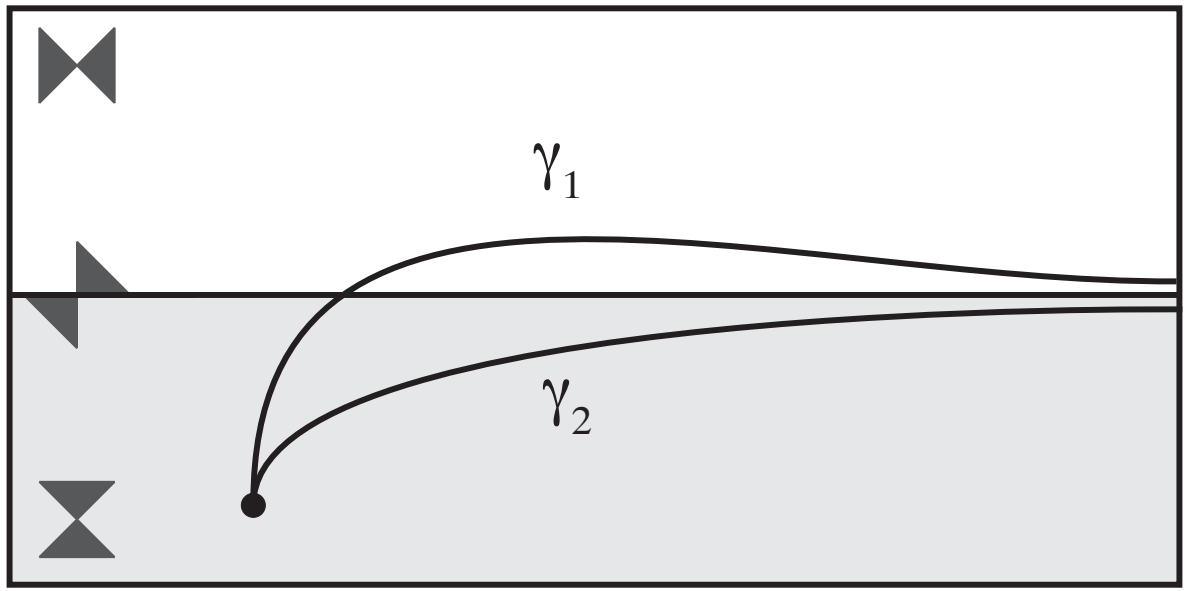
minkowski spacetime with a point removed

a spacetime is **inextendible** if it cannot be isometrically and properly embedded into a larger spacetime.

nb: inextendiblity is a function of the class of all ‘possible spacetimes’.



is minkowski spacetime ‘extendible’?



is the bottom half of misner spacetime ‘extendible’?

so: inextendibility presupposes a distinction between spacetimes which are ‘physically reasonable’ and those which are not.

but: epistemic hole-freeness does not presuppose a distinction between spacetimes which are ‘physically reasonable’ and those which are not.

thank you.