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Introducing Various Notions of Distances between Space-Times

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We introduce the notion of causally-null-compactifiable space-times which can be canonically converted into a compact timed-metric-spaces using the cosmological time of Andersson-Howard-Galloway and the null distance of Sormani-Vega. We produce a large class of such space-times including future developments of compact initial data sets and regions which exhaust asymptotically flat space-times. We then present various notions of intrinsic distances between these space-times (introducing the timed-Hausdorff distance) and prove some of these notions of distance are definite in the sense that they equal zero iff there is a time-oriented Lorentzian isometry between the space-times. These definite distances enable us to define various notions of convergence of space-times to limit space-times which are not necessarily smooth. Many open questions and conjectures are included throughout. This is joint work with Anna Sakovich. (presenting online)

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