

CHAPTER OVERVIEW

5: Curvature

General relativity describes gravitation as a curvature of spacetime, with matter acting as the source of the curvature in the same way that electric charge acts as the source of electric fields. Our goal is to arrive at Einstein's field equations, which relate the local intrinsic curvature to the locally ambient matter in the same way that [Gauss's law](#) relates the local divergence of the electric field to the charge density. The locality of the equations is necessary because relativity has no action at a distance; cause and effect propagate at a maximum velocity of c .

- [5.1: Introduction to Curvature](#)
- [5.2: Tidal Curvature Versus Curvature Caused by Local Sources](#)
- [5.3: The Stress-energy Tensor](#)
- [5.4: Curvature in Two Spacelike Dimensions](#)
- [5.5: Curvature Tensors](#)
- [5.6: Some Order-of-magnitude Estimates](#)
- [5.7: The Covariant Derivative](#)
- [5.8: The Geodesic Equation](#)
- [5.9: Torsion](#)
- [5.10: From Metric to Curvature](#)
- [5.11: Manifolds \(Part 1\)](#)
- [5.12: Manifolds \(Part 2\)](#)
- [5.13: Units in General Relativity](#)
- [5.E: Curvature \(Exercises\)](#)

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- Thumbnail: The overall geometry of the universe is determined by whether the Omega cosmological parameter is less than, equal to or greater than 1. Shown from top to bottom are a closed universe with positive curvature, a hyperbolic universe with negative curvature and a flat universe with zero curvature. (Public Domain; NASA).

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