

# Carroll General Relativity Solutions

. Then one is able to solve the Einstein field equations as a series in  $h$ . Classical theories of gravity, which do not involve quantum mechanics or force unification, drop higher order terms for simplicity. The first postulate was first formulated by Galileo Galilei (see Galilean invariance).

**Tests of general relativity** The precession of Mercury was already known; experiments showing light bending in accordance with the predictions of general relativity were performed in 1919, with increasingly precise measurements made in subsequent tests; and scientists claimed to have measured the gravitational redshift in 1925, although measurements sensitive enough to actually confirm the theory were not made until 1954. A more accurate program starting in 1959 tested general relativity in the weak gravitational field. Tests of general relativity serve to establish observational evidence for the theory of general relativity. The first three tests, proposed by Albert Einstein in 1915, concerned the "anomalous" precession of the perihelion of Mercury, the bending of light in gravitational fields, and the gravitational redshift.

According to Birkhoff's theorem, the Schwarzschild metric is the most general spherically symmetric vacuum solution of the Einstein field equations. A Schwarzschild black hole or static black hole is a black hole that has neither electric...

**General relativity** General relativity, also known as the general theory of relativity, and as Einstein's theory of

gravity, is the geometric theory of gravitation published General relativity, also known as the general theory of relativity, and as Einstein's theory of gravity, is the geometric theory of gravitation published by Albert Einstein in 1915 and is the accepted description of gravitation in modern physics. In particular, the curvature of spacetime is directly related to the energy, momentum and stress of whatever is present, including matter and radiation. The relation is specified by the Einstein field equations, a system of second-order partial differential equations. General relativity generalizes special relativity and refines Newton's law of universal gravitation, providing a unified description of gravity as a geometric property of space and time, or four-dimensional spacetime

. Locally, the metric on a Penrose diagram is conformally equivalent to the metric of the spacetime depicted. The conformal factor is chosen such that the entire infinite spacetime... None of these alternatives to general...

Alternatives to general relativity There have been many different attempts at constructing an ideal theory of gravity. to general relativity are physical theories that attempt to describe the phenomenon of gravitation in competition with Einstein's theory of general relativity Alternatives to general relativity are physical theories that attempt to describe the phenomenon of gravitation in competition with Einstein's theory of general relativity. These attempts can be split into four broad categories based on their scope:

The speed of light in vacuum is the same for all observers, regardless of the motion of light source or observer. This is known as the principle of light constancy, or the principle of light speed invariance.

General Relativity (book) General Relativity is a graduate textbook and reference on Albert Einstein's general theory of relativity written by the gravitational physicist Robert General Relativity is a graduate textbook and reference on Albert Einstein's general theory of relativity

written by the gravitational physicist Robert Wald f37df29051

Special relativity In Albert In physics, the special theory of relativity, or special relativity for short, is a scientific theory of the relationship between space and time. In Albert Einstein's 1905 paper,. In physics, the special theory of relativity, or special relativity for short, is a scientific theory of the relationship between space and time f37df29051

$\gamma$  f37df29051  $\{\displaystyle \gamma\}$  f37df29051 , (which is usually an exact solution) plus some small perturbation, f37df29051 Theories which attempt to explain gravity and other forces at the same time; these are known as classical unified field theories. f37df29051

Penrose diagram 10. 1103/PhysRevLett. general relativity) of the Minkowski diagram of special relativity where the vertical dimension represents time, and the horizontal dimension represents a space dimension. Using this design, all light rays take a  $45^\circ$  path. 471. p. Spacetime and Geometry – An Introduction to General Relativity. Carroll, Sean (2004). 66. ISBN 0-8053-8732-3 In theoretical physics, a Penrose diagram (named after mathematical physicist Roger Penrose) is a two-dimensional diagram capturing the causal relations between different points in spacetime through a conformal treatment of infinity. doi:10. Addison Wesley. It is an extension (suitable for the curved spacetimes of e. g f37df29051

( f37df29051 h f37df29051 Theories which attempt to both put gravity in quantum mechanical terms and unify forces; these are called theories of everything. f37df29051

Milne model Spacetime and geometry: an introduction to general relativity (1st ed. San Francisco: Addison The Milne model was a special-relativistic cosmological model of the universe proposed by Edward Arthur Milne in 1935. 1051/0004-6361/201833910. The Milne model is also similar to Rindler space in that both are simple re-parameterizations of flat Minkowski space. It is mathematically equivalent to a special case of the FLRW model in the limit of zero energy density and it obeys the cosmological principle. ). doi:10.

Carroll, Sean (2004)

The laws of physics are invariant (identical) in all inertial frames of reference (that is, frames of reference with no acceleration). This is known as the principle of relativity.  $c$ , as a background space-time, A common example of this method results in the linearised Einstein field equations. In this case we expand...  $h$   $g$  Since it features both zero energy density and maximally negative spatial curvature, the Milne model is inconsistent with cosmological observations. Cosmologists actually observe the universe's density parameter to be consistent with unity and its curvature to be consistent with flatness.

**Schwarzschild metric** The solution is a useful approximation for describing slowly rotating astronomical objects such as many stars and planets, including Earth and the Sun. Einstein's theory of general relativity, the Schwarzschild metric (also known as the Schwarzschild solution) is an exact solution to the Einstein field In Einstein's theory of general relativity, the Schwarzschild metric (also known as the Schwarzschild solution) is an exact solution to the Einstein field equations that describes the gravitational field outside a spherical mass, on the assumption that the electric charge of the mass, angular momentum of the mass, and universal cosmological constant are all zero. It was found by Karl Schwarzschild in 1916

"On the Electrodynamics of Moving Bodies", the theory is presented as being based on just two postulates:  $(c=1)$   $h$

**Non-exact solutions in general relativity** These solutions are typically found by treating the gravitational field,. These Non-exact solutions in general relativity are solutions of Albert Einstein's field equations of general relativity which hold only approximately. Non-exact solutions in general relativity are solutions of Albert Einstein's field equations of general relativity which hold only approximately

Newton's law of universal gravitation, which describes gravity in classical... f37df29051 Theories using the principles of quantum mechanics resulting in quantized gravity. f37df29051

Congruence (general relativity) In general relativity, a congruence (more properly, a congruence of curves) is the set of integral curves of a (nowhere vanishing) vector field in a four-dimensional In general relativity, a congruence (more properly, a congruence of curves) is the set of integral curves of a (nowhere vanishing) vector field in a four-dimensional Lorentzian manifold which is interpreted physically as a model of spacetime. Often this manifold will be taken to be an exact or approximate solution to the Einstein field equation f37df29051

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