

GENERAL RELATIVITY

A Quick Guide

Huan Bui

Colby College
Department of Physics and Astronomy
Class of 2021

December 15, 2018

Contents

1	Overview and Review	2
1.1	Review of Special Relativity	2
1.2	The Equivalence Principle	2
1.3	Versions of the Equivalence Principle	2
1.3.1	The Strong Equivalence Principle	2
1.3.2	The Weak Equivalence Principle	2
2	Review of Multivariable and Vector Calculus	2
3	Flat 3-D space	2
4	Flat spacetime	2
5	Curved spaces	2
6	Gravitation and Curvature	2
7	Einstein's field equations	2
8	Predictions and tests of general relativity	2
9	Cosmoslogy	2

1 Overview and Review

What is general relativity? It's a theory of gravity.

Replaces Newton's law of gravity, for heavy masses and high precision.

Keep in mind, GR is not compatible with Quantum Mechanics.

Question in Physics: how to reconcile GR and QM?

1.1 Review of Special Relativity

1.2 The Equivalence Principle

1.3 Versions of the Equivalence Principle

1.3.1 The Strong Equivalence Principle

1.3.2 The Weak Equivalence Principle

2 Review of Multivariable and Vector Calculus

3 Flat 3-D space

4 Flat spacetime

5 Curved spaces

6 Gravitation and Curvature

7 Einstein's field equations

8 Predictions and tests of general relativity

9 Cosmosology