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EAGLE starting aid in general relativity. Gravitation with Newton and Einstein. (EAGLE Starthilfe Allgemeine Relativitätstheorie. Die Gravitation bei Newton und Einstein.)

EAGLE 87. Leipzig: Edition am Gutenbergplatz Leipzig (EAGLE) (ISBN 978-3-95922-087-3). 109 p. (2015).

This book has a remarkable history: 40 years ago, the two authors worked in the same research institute in Potsdam, and concentrated on theories of gravitation and their astrophysical applications. Already at that time, I remember, did they speak about the necessity to present the topics of gravitation research to a broader audience. Now, they come with this interesting presentation which can be used in two different versions: First, one can simply read the text and look at the many figures and pictures, and has some good popular impression. Or, second, one can try also to follow the many formulas, and then one has got a text which can serve also as an undergraduate university lecture course. The book has four main parts: 1. Space and time, 2. Newton's theory of gravitation, 3. Einstein's theory of gravitation, 4. Cosmology. In 1., length and time units, the problem of simultaneity, and the formulas for the relativistic addition of velocities are given. In 2, Newton's axioms, his gravitation law, and the distinction between several possible definitions of the notion "mass" are given. Part 3 starts with the equivalence principle, gives a short introduction to Riemannian geometry and curved space-time, and shows, how matter can be compared with geometry via the Einstein field equation. The equation of motion is deduced, as well as the geometry of the Schwarzschild black hole. The classical tests of general relativity theory are presented, too. Relativistic star models and gravitational waves close this part. In 4, mainly the Friedmann models are discussed in detail. Further, gravitational lenses and the formation of structure in the early universe are presented. Exercises with solutions are given, too. Some minor errors should be corrected in a further edition: At several places in the formulas, e.g., pages 40 and 41, the letter *o* is printed instead of the number 0. On page 43, in the deduction of the Birkhoff theorem, after Equation (77) it has to be mentioned, that from the beginning, the coordinate r may be timelike or spacelike, and only under additional assumptions, it will be spacelike. And on page 105, where several units and constants are listed, the printed value of the solar mass is wrong. See also [Relativitätstheorie von A bis Z. Einsteins Spezielle Relativitätstheorie. Leipzig: Edition am Gutenbergplatz Leipzig (EAGLE) (2013; Zbl 1279.83001)] for a related book by the same authors. *Hans-Jürgen Schmidt (Potsdam)*

Classification: M55
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