

<<广义相对论基础教程>>

图书基本信息

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内容概要

《广义相对论基础教程(第2版)(英文影印版)》是一部教程，这是第二版，用尽可能少的数学背景，清晰，易懂，简明地介绍了广义相对论。

在相对论的框架内尽可能全面的包括更多的内容，从黑洞到引力透视，脉冲星到整个宇宙学的研究，形成一个有机的整体。

书中包括了天体学家的很多重大发现，增加了一章讲述相对论星体，包括了有关脉冲星的最新知识，有关宇宙学的一章完全更新，全面，综合的讲述了现代发展和预期前景。

300多道练习题，许多是这本书中新增加的，这让学生有足够的信心学习好广义相对论和必需的数学知识，本书的写作风格更加使得这门科目更加容易理解。

目次：狭义相对论；狭义相对论中的向量分析；狭义相对论中的张量分析；狭义相对论中的完全流；曲率介绍；弯曲流形；弯曲时空中的物理学；einstein场方程；引力辐射；星体的球面解；schwarzschild几何和黑洞；宇宙学。

读者对象：适用于高年级本科生及更层次的，对宇宙学，天体物理学，以及引力物理实验感兴趣的科研人员。

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章节摘录

版权页：插图：Although stationary black holes are simple, there are situations where black holes are expected to be highly dynamical, and these are more difficult to treat analytically. When a black hole is formed, any initial asymmetry (such as quadrupole moments) must be radiated away in gravitational waves, until finally only the mass and angular momentum are left behind. This generally happens quickly: studies of linear perturbations of black holes show that black holes have a characteristic spectrum of oscillations, but that they typically damp out (ring down) exponentially after only a few cycles (Kokkotas and Schmidt 1999). The Kerr metric takes over very quickly. Even more dynamical are black holes in collision, either with other black holes or with stars. As described in Ch. 9, binary systems involving black holes will eventually merge, and black holes in the centers of galaxies can merge with other massive holes when galaxies merge. These situations can only be studied numerically, by using computers to solve Einstein's equations and perform a dynamical simulation. Numerical techniques for GR have been developed over a period of several decades, but progress initially was slow. The coordinate freedom of general relativity, coupled with the complexity of the Einstein equations, means that there is no unique way to formulate a system of equations for the computer. Most formulations have turned out to lead to intrinsically unstable numerical schemes, and finding a stable scheme took much trial and error. Moreover, when black holes are involved the full metric has a singularity where its components diverge: this has to be removed from the numerical domain, because computers can work only to a finite precision. See Bona and Palenzuela-Luque (2005) and Alcubierre (2008) for surveys of these problems and their solutions.

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