Review of “Six Not-So-Easy Pieces” by Richard P. Feynman

By GPE

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This book is a self-contained sequel to Six Easy Pieces, both of which are taken from the Feynman Lectures on Physics. The Feynman Lectures on Physics were lectures given to the first two years of physics undergraduates at Caltech from 1961 to 1963, thus this is squarely undergraduate physics. The book is about relativity and symmetry. It has a lovely introduction by Roger Penrose.

Chapter 1 introduces vectors and their arithmetic and basic calculus. We are given the transformation equations between translated and rotated coordinates, and it is demonstrated that translation and rotation do not affect Newtonian physics. The exposition is wonderfully clear throughout the whole book.

Chapter 2 is about symmetry in physics and hints at Noether’s Theorem, but the discussion is largely physical and the chapter contains little maths. These first two chapters set the scene for what is to come.

Chapter 3 introduces Einstein’s special relativity. It discusses the principle of relativity, the Lorentz transformations and the Mitchelson-Morley experiment, before going on to a discussion of simultaneity, four vectors, relativistic dynamics and mass energy equivalence. Thus the chapter gives an excellent introduction to the subject, whilst gently introducing the required maths. The next chapter continues with a discussion of relativistic energy and momentum and briefly explains the twin paradox. Conservation of energy and momentum are explained in some detail and there is further description of four vectors in relation to energy momentum.

Chapter 5 on space-time further discusses four vectors and introduces natural units (i.e. c = 1), the interval and space-like, time-like, and null regions of a spacetime diagram.

The final chapter is a very clear and gentle introduction to general relativity. It explains curved space, space-time and gravitation wonderfully well and gives a brilliant explanation of how the paths objects take through space-time maximise the proper time and how this path is given by the Lagrangian.

I really enjoyed reading this book and it has whetted my appetite for the Feynman Lectures on Physics.