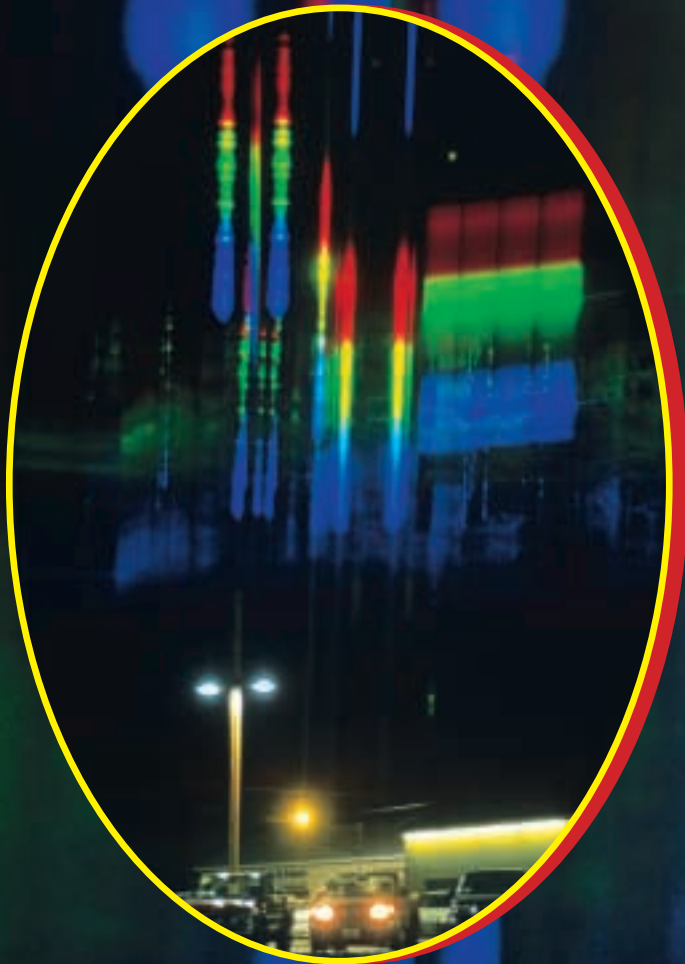


UNIT
7

Waves and Modern Physics



UNIT CONTENTS

CHAPTER 17 Special Theory of Relativity

CHAPTER 18 Early Quantum Theory

CHAPTER 19 Quantum Theory and the Atom

The turn of the twentieth century was a time of excitement and turmoil in science. In 1888, Heinrich Hertz demonstrated the existence of radio waves and then, in 1895, Wilhelm Conrad Röntgen discovered X rays. The following year, Antoine Henri Becquerel discovered radioactivity and, a year later, J.J. Thomson discovered the electron. Then, Philipp Lenard observed the photoelectric effect in which light ejected electrons from metals.

Along with these discoveries came a number of puzzles. How could radioactive substances emit radiation without any apparent source of energy? Why could only certain colours of light eject electrons from metals? For nearly 50 years, spectroscopists wondered why each element gave off a unique spectrum of light. Since light crossed the vacuum of space between Earth and the stars, physicists assumed that a substance called “luminiferous ether” must exist to carry light waves. However, all attempts to detect Earth’s motion through it failed.

In this unit, not only will you learn more about the discoveries of some of the most outstanding scientists who ever lived, but also you will learn the answers to some of the questions that baffled them.

UNIT PROJECT PREP

At the end of this unit, you will have a chance to examine the parallels between scientists and their theories with societal pressures and realities. Go to your e-book for a preview of the issues to keep in mind as you read this unit.

- How closely tied do you think scientific research is to societal pressures?