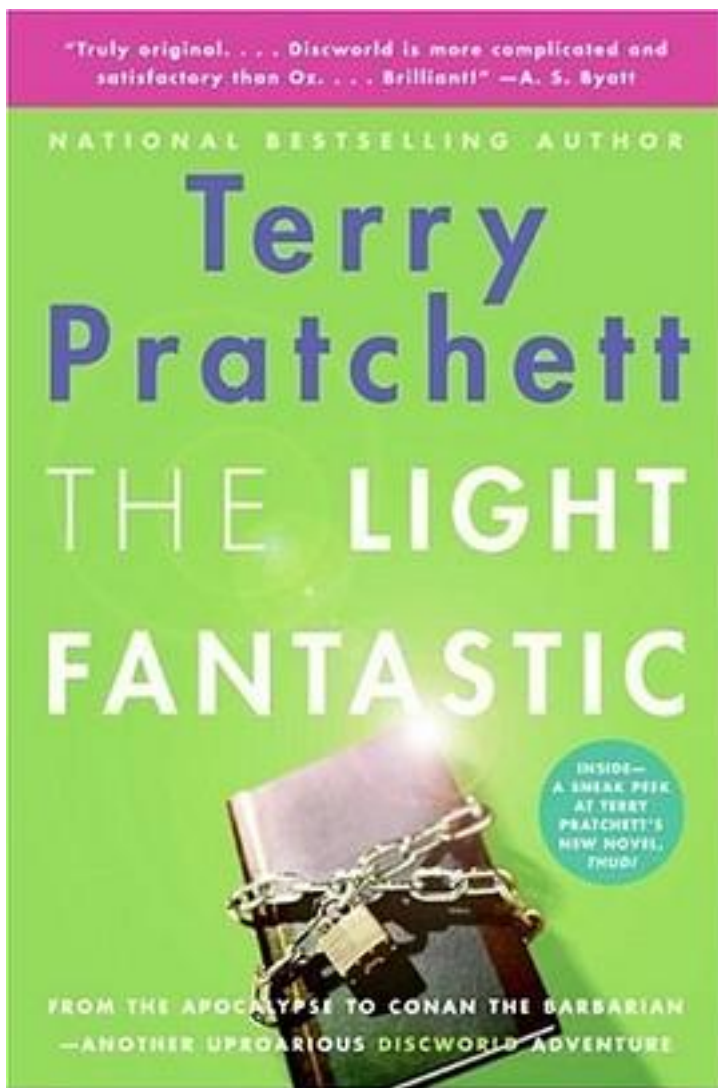


The Light Fantastic



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This book presents a thorough and self-contained introduction to modern optics, covering in full the three components ray optics, wave optics, and quantum optics. The text covers all that would be needed over a comprehensive course in optics at the advanced undergraduate or beginning graduate level. Digital cameras, LCD screens, aircraft laser gyroscopes, and the optical fibre-based internet illustrate the penetration of optics in twenty-first century life: these and many more modern applications are presented from first principles. The self-contained material allows the selection of specific themes grouped in the following way: Paraxial ray optics with matrix methods and aberrations. Interference, coherence and interferometers. Diffraction, spectrometers and Gaussian beams. Fourier optics, holography and information processing. Maxwell's theory; scattering, absorption and dispersion in bulk materials; interface behaviour. Quantum phenomena, wave-particle duality, uncertainty principle; Schroedinger analysis of spectra, photon properties. Laser principles, He:Ne to MQW lasers, applications. Detectors: photodiodes, photomultipliers, image intensifiers; response, noise and linearity; CCDs. Fibre optics, from monomode fibre analysis to dense wavelength division multiplexing; fibre sensors. Photon-atom interactions, optical pumping, cooling and clocks. Second quantization, photon correlations, SPDC, entanglement, tests of quantum mechanics.

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