

# Contents

## I. Optics, lasers, technological applications

Inside a Helium Neon Laser . . . . .	3
Jefferson Strait	
Frequency Stabilization of a Helium Neon Laser . . . . .	7
Kevin Jones and Kevin Forkey	
Longitudinal Modes in a Diode Laser . . . . .	15
Kevin Jones	
Technical Aspects of Using Linear Diode Arrays in Student Labs . . . . .	21
Lutz Hüwel and Darrell Karbott	
Using a Low Cost Acousto-optic Modulator to Demonstrate an Index Grating . . . . .	31
Kevin Jones	
Electro-optic Effect in Lithium Niobate . . . . .	35
Jefferson Strait and Chad R. Orzel	
Optical and Electro-Optical Properties of Liquid Crystal Layers . . . . .	41
Hendrik J. Gerritsen	
Nonlinear Optics with a Low Power Laser . . . . .	61
George F. Tucker, Keith M. Bryant, and David Daniels	
“X-ray Diffraction” with a Helium Neon Laser . . . . .	67
Kevin Jones	
Attenuation in Optical Fibers: Optical Time Domain Reflectometry . . . . .	75
Jefferson Strait and Frank Grassia	

## II. Spectroscopy, quantum mechanics

Spectroscopy Experiments with a High Resolution Monochromator (overview, H&D spectra and mass of deuteron, Zeeman effect in mercury) . . . . .	85
Jeffrey S. Dunham and Crispin O. Butler	
Experiments With a 1 meter Spectrometer (H-D splitting, Zeeman effect in mercury, line profile fitting, diode lasers) . . . . .	105
Bruce Hawkins and Michelle Phelan	
The Photon as Billiard Ball: the Raman Effect . . . . .	111
Kevin Jones	
A Simple Dye Laser Design Using Standard Components . . . . .	115
Kevin Jones	
A Quantum Oscillator: Laser Induced Fluorescence in $I_2$ . . . . .	121
Kevin Jones	

## III. Other

An Improved Millikan Experiment . . . . .	127
Steve Gensemer and George A. Ruff	