

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 Acoustooptic Modulator to Demonstrate an Index Grating	31
Kevin Jones	
Electrooptic 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	