TABLE OF CONTENTS

Selected Student Papers

A Message from the Under Secretary for Science
Journal Editors
Technical Review Board
A Note from the Editor
Science: Change, Growth, or Progress?
National Laboratories: Agents of Change

About the Cover

The cover illustration provides examples of the many different scales at which science has changed our understanding of nature. The development of increasingly sophisticated tools has provided us with new ways to see the world around us. Our front and rear covers illustrate how modern technologies have allowed scientists to create images of the ocean floor, penetrating the veil of the overlying ocean water.

The Möbius strip demonstrates the interconnectedness of all things in the universe. Images depict objects and phenomena that range in scale from sub-atomic particles to galaxies. Living and non-living examples are juxtaposed, as are natural and man-made. The scientific instruments used to study these phenomena and examples of technologies which have resulted from our changing understanding of nature complete the montage.

Most prominently featured are images of the collision of subatomic particles and of a spiral galaxy. The Department of Energy's research programs investigate phenomena at all scales in the universe, from the very, very small to the very large. Images from the Department's Fermi National Accelerator Laboratory and Laser Interferometer Gravitational Wave Observatory serve to represent the breadth of the Department's scientific programs.

Microscope image courtesy of Tennessee Technological University; herring nest courtesy of Cornell University; particle physics image and Wilson Hall image courtesy of Fermilab; whirlpool universe and earth images courtesy of NASA; LIGO mirror telescope courtesy of LIGO Hanford Observatory; earth without water courtesy of Celestia Motherlode

Craig Bookwalter, Alexander Ostrovidov, and Paul Eugenio
The Effects of Surface Chemistry on the Properties of Proteins Confined in Nano-porous Materials15
Latasha M. Garrett and Hugh O'Neill
Comparison of the Populations of Common Wood-Nymph Butterflies in Burned Prairie, Unburned Prairie and Old Field Grasses
Marlene Hahn and Rod Walton
Analysis of the Water-Splitting Capabilities of Gallium Indium Phosphide Nitride (GalnPN)26
Jeff Head and John Turner
Study of Beam Spin Asymmetry in Exclusive π° Production32 lan Howley and Harut Avagyan
Thermophoresis and its Thermal Parameters for Aerosol Collection
Zhuo Huang, Michael Apte, and Lara Gundel
Solvent Purification and Fluor Selection for Gadolinium-loaded Liquid Scintillators43
Tigisti Kesete, Amanda Storm, Richard L. Hahn, Minfang Yeh, and Suzanne Seleem
Adaptively Improving Long Distance Network Transfers with Logistics48
David LaBissoniere and Kenneth Roche
Examination of Dislocations in Lattice-Mismatched GalnAs/Buffer Layer/GaAs for III-V Photovoltaics55
Alejandro Levander and John Geisz
Characterizing the Role of the <i>Nell1</i> Gene in Cardiovascular Development63
Leah Y. Liu and Cymbeline Culiat
A New GUI for Global Orbit Correction at the ALS Using MATLAB71
Jacob Pachikara and Gregory Portmann

Selected Student Papers, Continued	Student Abstracts	135
Development of Emittance Analysis Software for Ion Beam Characterization77	Biology	136
	Chemistry	148
Mariano J. Padilla and Yuan Liu	Computer Science	158
	Engineering	166
Novel Coarsening of Pb Nanostructures on Si(111) 7 X 782 Charles J. Pye, Michael Yakes, Myron Hupalo, and Michael Tringides	Environmental Science	183
	General Sciences	197
Power Grid Dynamics: Enhancing Power System Operation through Prony Analysis87	Materials Sciences	199
	Medical and Health Sciences	206
Cody Ray and Zhenyu Huang	Nuclear Sciences	209
	Physics	212
Synthesis of Novel Crown Ethers Bearing the <i>exo-cis</i> -2,3-Norbornyl Group as Potential Na ⁺ and K ⁺ Extractants91	Science Policy	227
Rachel M. Robeson and Peter Bonnesen	Participating National Laboratories	
Host Galaxies of X-shaped Radio Sources	Ames Laboratory	228
	Argonne National Laboratory	
	Brookhaven National Laboratory	
Calculation of Particle Bounce and Transit Times on	Fermi Accelerator Laboratory	
General Geometry Flux Surfaces	Idaho National Laboratory	
	Lawrence Berkeley National Laboratory	
Climate Change Effects on Species Composition Mediates Decomposition in an Old-field Ecosystem110 Marlene L. Tyner and Aimée T. Classen	Lawrence Livermore National Laboratory	
	Los Alamos National Laboratory	
	National Renewable Energy Laboratory	
Lipid Production by Dunaliella Salina in Batch Culture:	Oak Ridge National Laboratory	
Effects of Nitrogen Limitation and Light Intensity115 Chad Share Weldy and Michael Huesemann	•	
	Pacific Northwest National Laboratory	
GEANT Simulations of Preshower Calorimeter for CLAS12 Upgrade of the Forward Electromagnetic Calorimeter123 Kristin Whitlow and Stepan Stepanyan	Princeton Plasma Physics Laboratory Stanford Linear Accelerator Center	
		240
	Thomas Jefferson National Accelerator Facility	241
A Comparison of DNA Damage Probes in		0.45
Two HMEC Lines with X-Irradiation130 Christy L. Wisnewski, Kathleen A. Bjornstad,	Index of Authors	
Christopher J. Rosen, Polly Y. Chang, and Eleanor A. Blakely	Index of Schools	251
	DOE Office of Science Programs	