ΣΠΣ UNDERGRADUATE RESEARCH AWARD RECIPIENTS

1997-98

COLORADO AT COLORADO SPRINGS, UNIVERSITY OF
Colorado Springs, CO
Tom Christensen, Faculty Advisor
“Thundercloud Electrodynamics”

CARTHAGE COLLEGE
Kenosha, WI
Elizabeth Murphy, Faculty Advisor
“An Astronomical Tour of Arizona and New Mexico”

WISCONSIN-RIVER FALLS, UNIVERSITY OF
River Falls, WI
Earl Blodgett, Faculty Advisor
“Binary Star Separation by Visible Light Interferometry”

NORTHWESTERN STATE UNIVERSITY OF LOUISIANA
Natchitoches, LA
Gary White, Faculty Advisor
“Characterization of Organic Optical Crystals Subjected to Ion Beam Irradiation”

WRIGHT STATE UNIVERSITY
Dayton, OH
Gust Bambakidis, Faculty Advisor
“Investigation and Analysis of Possible Weight Changes in a Mass Suspended Above a High Temperature Superconductor”

COLORADO SCHOOL OF MINES
Golden, CO
Tim Ohno, Faculty Advisor
“Design and Building of a 12.5” Newtonian Reflector for Undergraduate Research”

1998-99

NORTH CAROLINA-GREENSBORO, UNIVERSITY OF
Greensboro, NC
Robert Muir, Faculty Advisor
“Measuring Instabilities of Wave Propagation in Excitable Media: Application to Action Potentials in Nerves”

NORTHWESTERN STATE UNIVERSITY OF LOUISIANA
Natchitoches, LA
Gary White, Faculty Advisor
“Study of Variable Stars and Star Clusters Using a Charge-Coupled Device Camera”

WISCONSIN-MADISON, UNIVERSITY OF
Madison, WI
Don Cox, Faculty Advisor
“Boundary Phenomena and the Jet Formation Theory of Sonoluminescence”

2000-2001

GEORGIAN COURT COLLEGE, LAKewood, NJ
Anne Tabor-Morris, Faculty Advisor
“The Presence of Pollutants in the Air at the Ground Level Atmospheric Boundary Layer”

SAN DIEGO STATE UNIVERSITY, SAN DIEGO, CA
Matthew E. Anderson, Faculty Advisor
“Beam Alignment Guide for Laser Experiments (BAGLE)”

2001-2002

COE COLLEGE, CEDAR RAPIDS, IA
Steve Feller, Faculty Advisor
“Atomic Structural Analysis of Sodium Borosilicate, Bismuth Borate, Alkali Borate, and Mixed Alkali Borate Glasses by Neutron Scattering”

NORTHWESTERN STATE UNIVERSITY, NATCHEZIOTES, LA
Paul Withey, Faculty Advisor
“Upgrading a Manual Acquisition Telescope to an Astrometric Advanced Control System”

ROWAN UNIVERSITY, GLASSBORO, NJ
Sam Lofland, Faculty Advisor
“Second Harmonic Generation in Non-Linear Optical Materials”

SEATTLE UNIVERSITY, SEATTLE, WA
Mary Alberg, Faculty Advisor
“Construction of Seattle University Beowulf Cluster (SUBC) for Use in Solving Computation Physics Problems”

2002-2003

JOHNS HOPKINS UNIVERSITY, BALTIMORE, MD
Petar Maksimovic, Faculty Advisor
“STILLMix: Surface Tension Impelled Low-gravity Liquid Mixing Experiment”

UNIVERSITY OF MISSOURI-KANSAS CITY, KANSAS CITY, MO
Michael Kruger, Faculty Advisor
“Construcation of a Micro-Raman and the Analysis of HfV$_2$O$_7$”

NORTHERN VIRGINIA COMMUNITY COLLEGE, ANNANDALE, VA
Walerian Majewski, Faculty Advisor
“Cosmic Ray Muons: Detection and Muon Mean Lifetime Measurement”

OHIO NORTHERN UNIVERSITY, ADA, OH
Mellita Caragiu, Faculty Advisor
“Setting Up of an Advanced Lab”

ROWAN UNIVERSITY, GLASSBORO, NJ
Sam Lofland, Faculty Advisor
“Investigation of Electronic Instabilities in Quasi-Low-Dimensional Materials With Optical Reflectance Spectroscopy”

UNIVERSITY OF SOUTH ALABAMA, MOBILE, AL
R. Kent Clark, Faculty Advisor
“Investigating “Neglected” Binary Stars”

TENNESSEE, UNIVERSITY OF, KNOXVILLE, TN
James Parks, Faculty Advisor
“Construction of a Scintillator Detector for High Energy Cosmic Ray Showers”

TRUMAN STATE UNIVERSITY, KIRKSVILLE, MO
Taner Edis, Faculty Advisor
“Building a Scanning Tunneling Microscope to Study Surface Properties of Thin Films”
2003-2004

CYPRESS COLLEGE, CYPRESS, CA
Ron Armale, Faculty Advisor
“Constructing a Cosmic Ray Detector and Investigating the Nature of Secondary Cosmic Rays”

DRAKE UNIVERSITY, DES MOINES, IA
Athanasios Petridis, Faculty Advisor
“Assembly and Initial Operation of a Transmission Electron Microscope”

FLORIDA INSTITUTE OF TECHNOLOGY, MELBOURNE, FL
Rong-Sheng Jin, Faculty Advisor
“Electrochemical Deposition Experiment (EDEP)”

OLD DOMINION UNIVERSITY
Norfolk, VA
Charles Wright-Hyde, Faculty Advisor
“Laser Cooling and Trapping Apparatus for Undergraduate Study”

PITTSBURG STATE UNIVERSITY, PITTSBURG, KS
R. S. Wijesinghe, Faculty Advisor
Jim Lookadoo, Project Advisor
“Analysis of Acceleration Sensitivity on Crystal Oscillators by Measurement of Frequency Shift Effects”

ROWAN UNIVERSITY, GLASSBORO, NJ
Sam Lofland, Faculty Advisor
“Construction of an Apparatus to Study Fast Atomic Recombination in Ultracold Plasmas”

2004-2005

ARIZONA STATE UNIVERSITY
Richard Lebed, Faculty Advisor
Prepared & Submitted by: Christopher Anderson, Mark Drabant, Wayne Kinsey, Mike O’Toole, Bruce J.A. Nourish
“Analysis of the Crystal Structure of Oxalate Kidney Stones”

PITTSBURG STATE UNIVERSITY, PITTSBURG, KS
SPS Advisor: Serif Uran
Project Advisor: James Lookadoo
Prepared & Submitted by: Jeremy Burnison, Cassandra Stuckey, Jacob Stich and Emily Pentola
“Crystal Oscillator Acceleration Sensitivity Testing (COAST)”

SAGINAW VALLEY STATE UNIVERSITY, UNIVERSITY CENTER, MI
Ming-Tie Huang, Faculty Advisor
Prepared & Submitted by: Christopher S. Hopper
“Laser Cooling & Trapping of Rubidium Atoms”

STATE UNIVERSITY OF NEW YORK-BROCKPORT, BROCKPORT, NY
Mohammad Z. Tahar, Faculty Advisor
Prepared & Submitted by: Joseph Murphy, Jeremy Hewitt, Nicholas Lefort, Justin Brown and Kristina Fuller
“Chaos in a Sinusoidally Driven Resistor-Inductor-Diode Circuit and in a Driven, Damped Torsion Pendulum”

UNIVERSITY OF WISCONSIN-LA CROSSE, LA CROSSE, WI
Michael Jackson, Faculty Advisor
Prepared & Submitted by: Brooke Chuzles, Matthew Spurr, Michael Theisen and Sarah Petersen
“Measurement and Application of Far-Infrared Laser Emissions”

2005-2006

UNIVERSITY OF CENTRAL FLORIDA
Faculty Advisor: Costas Efthimiou
Principal Proposer: Sohang C. Gandhi
“The Ascending Double Cone: Verifying & Demonstrating the Motion of the Double Cone V-rail System”

UNIVERSITY OF COLORADO-COLORADO SPRINGS
Faculty Advisor: Anatoly Glushchenko
Principal Proposer: Diana Haskins
Additional Proposers: Tim Mal, Mike Steinman, Diana Qiu, & Audra Tadevich Lee
“Stressed Liquid Crystals for Large Phase Shift Modulation”

EASTERN MICHIGAN UNIVERSITY
SPS Advisor: Diane Jacobs
Research Advisor: James Carroll
Principal Proposers: Stephanie Sears & Jeremy McMinis
“Investigating Experimental Parameters in a New Plasma Source”

NORTHERN VIRGINIA COMMUNITY COLLEGE
Faculty Advisor: Walerian Majewski
Principal Proposers: John Jones, Pooya Azar, Daniel Gordon, Aziza Dang, Taha Ferozpu, Adam Reed, & Steven Hendrickson
“Applications of the Superconducting Meissner Effect”

NORTH DAKOTA STATE UNIVERSITY
Faculty Advisor: Alexander Wagner
Principal Proposer: Adam Jones
“Morphologies of Polymeric Membranes Formed by Immersion Precipitation”

UNIVERSITY OF TEXAS-ARLINGTON
Faculty Advisor: Jae-Hoon Yu
Principal Proposers: Kenneth Crawford, James Creel, Priya Mydur, Jacob Smith, Shane Spivey, & Sabine Sudhut
“Large Cloud Chamber Prototype at UT-Arlington”

2006-2007

CENTRAL WASHINGTON UNIVERSITY
Principal Proposers: Taylor Kendall, David Cross, James Mullen and Eric Kangas
Chapter Advisor: Dr. Sharron L. Rosell
Faculty Advisor: Dr. Michael R. Braunstein
“Electronic Realization of Chaotic Systems”

IDAHO STATE UNIVERSITY
Principal Proposers: Zeb Graham, David Coneff and Andrew SAYLER
Faculty Advisors: Dr. Dan Dale and Dr. Steven Shropshire
“A Measurement of the Atmospheric Optical Thickness Using Photovoltaic Cells”

INDIANA UNIVERSITY
Principal Proposers: Greg Pauley and Andrew Ferguson
Chapter Advisor: Dr. Mike Snow
Faculty Advisor: Dr. Rick Van Kooten
“Studies of a Pyroelectric Crystal to Develop a Tabletop Neutron Source”

UNIVERSITY OF LOUISVILLE
Principal Proposers: Timothy Allen, Brett Batchelor, Albert Bolander, Blakesley Burkhart and Benjamin Smook
Faculty Advisor: Dr. David Brown
“Two Panel Cosmic Ray Telescope”

UNIVERSITY OF SOUTHERN MISSISSIPPI
Principal Proposers: Dwana J. King, Gregory Carson, Tyler McLeery and Randall Dannemann
Faculty Advisor: Dr. Alina Gearba
“Characterization of a Rubidium Magneto-Optical Trap”
UNIVERSITY OF COLORADO-COLORADO SPRINGS, COLORADO SPRINGS, CO
Principal Proposers: James Vedral, Evangelos Economou, C. Travis Hunter, Christopher Bull, Hoshang Almemar, Sara Goldman and Robert Webber
Faculty Advisor: Dr. Anatoliy Glushchenko

“Ferroelectric Nanoparticles Suspended in Liquid Crystals”

From wristwatches to the most advanced computer systems on earth, liquid crystals have made their way into every aspect of our lives. Since liquid crystals have been introduced to the industry there has been a great demand to reduce their energy consumption. That is the great problem, making a stable liquid crystal display that uses less energy. There is a possible solution, mixing liquid crystals with material that posses a higher sensitivity to electric fields. There are preliminary results which suggest the feasibility of creating such materials.

Although this solution may sound simple, there are major problems that need to be overcome in order to make this not only “a lab sample,” but a practical reality. Through the support of the SPS and the use of the UCSS Liquid Crystal Research Lab, we look forward to becoming engaged in this project. Particularly, by creating a stable “liquid crystal enriched with ferroelectric nanoparticles,” we will have successfully lowered the energy consumption of all liquid crystal devices. This would not only mean longer battery life for cell phones and laptops, it would mean a great leap in the science of liquid crystals and a new frontier in the industry.

RHODES COLLEGE, MEMPHIS, TN
Principal Proposers: Brad Atkins, Gavin Franks, Josh Fuchs, Lulu Li, Chase Sliger and Jennifer Thompson
Faculty Advisor: Dr. Brent K. Hoffmeister

Interim Project Report: “Binary Orbital Motion of Electrically Charged Spheres”

Coulomb’s Law of Electrostatics and Newton’s Law of Gravitation suggest that two oppositely charged spheres should be able to move in binary orbit about their center of mass using only the electric force as the force of attraction. The Rhodes College Chapter of SPS will attempt to achieve a binary orbit between oppositely charged graphite coated styrofoam spheres in a near-zero gravity environment as part of NASA’s Microgravity University.

UTAH STATE UNIVERSITY, LOGAN UT
Principal Proposers: Jennifer Albreten and Christian Wohlwend
Chapter Advisor: Dr. David Peak

Interim Project Report: “Investigating the Effects of Atmospheric Composition on Sound Emitted by a Tesla Coil Speaker”

Plasma speakers (a.k.a. tesla coil speakers) have gained popularity over the past few years, but little scientific work has been performed on them as most are built by hobbyists. The USU Chapter of the Society of Physics Students will build a small tesla coil modeled after the coronaphone developed at Villanova University. Chapter members will record the sound propagating through four gases: Nitrogen (N2), Carbon Dioxide (CO2), and Argon (Ar). These spectra will be compared with one another and with data taken in air, to see if changes in sonic spectra reflect properties of the gases.