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MONTGOMERY

**MONTGOMERY
COUNTY
SCIENCE FAIR
2012**

2012 Platinum Sponsor

**MARCH 16, 17, 18
RECKORD ARMORY
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MedImmune

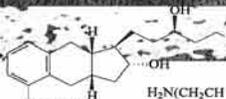
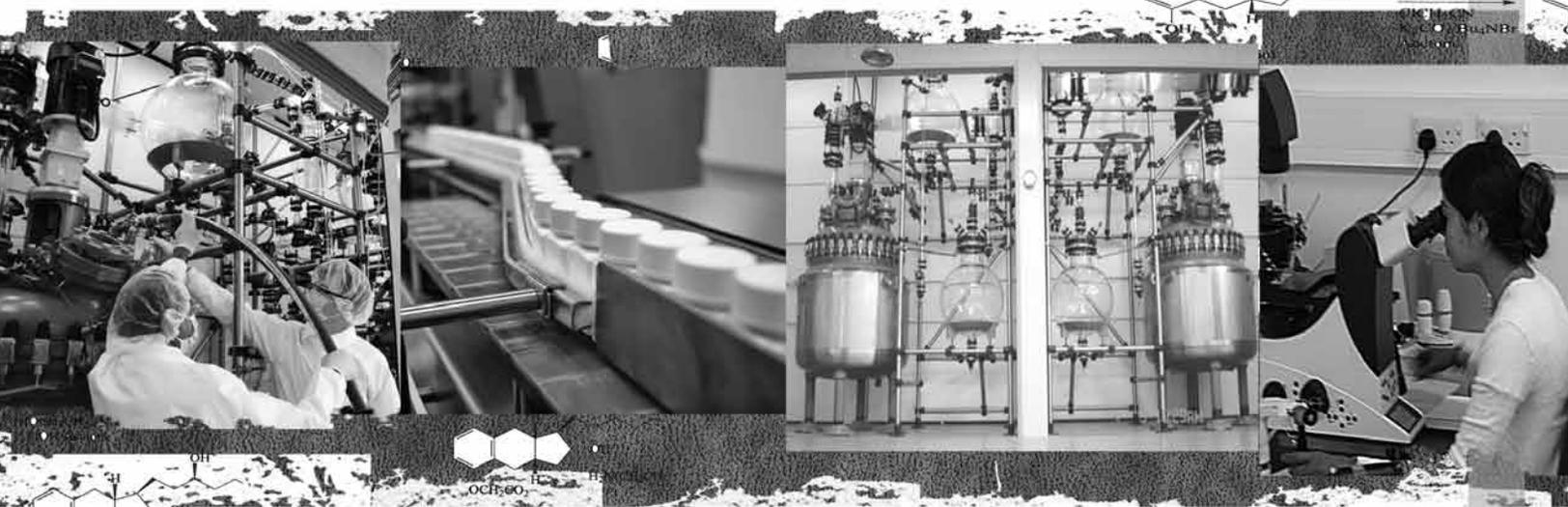
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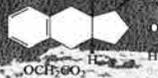
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2012 Science Sponsors

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THE 2012 SCIENCE FAIR**



2012  **Science** Fair Schedule
MONTGOMERY

www.ScienceMONTGOMERY.org

FRIDAY, MARCH 16, 2012

4 PM – 9 PM

Student Project Set Up: Set-up display boards and go through Safety Inspection in Reckord Armory Building, University of Maryland, College Park

SATURDAY, MARCH 17, 2012

8 AM – 12 Noon

Judges Project Preview Period
(No students present)

12 Noon – 3:00 PM

Students Grades 9-12 Interviews
(by Judges and Community Awards Organizations)

2:30 PM – 5:00 PM

Students Grades 6-8 Interviews
(by Judges and Community Awards Organizations)

5:00 PM – 6:00 PM

Project Removal

SUNDAY, MARCH 18, 2012

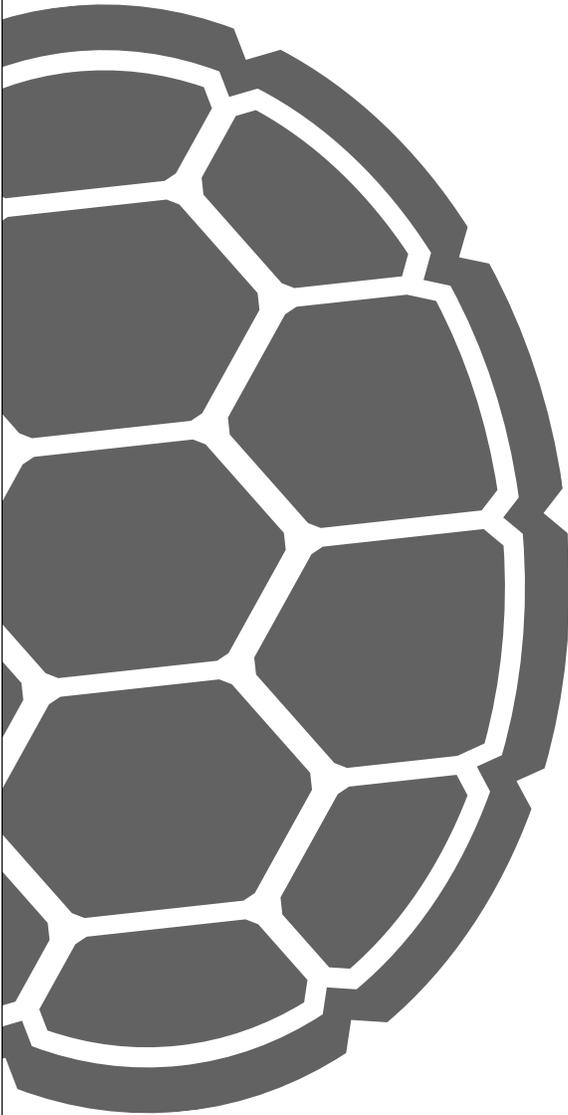
2:00 PM – 4:00 PM

Awards Ceremony at Watkins Mill High School Auditorium

4:00 PM – 5:00 PM

Meeting with ScienceMONTGOMERY Senior High School International Science and Engineering Fair (ISEF) Winners about trip to Pittsburgh, PA for ISEF, Watkins Mill High School Auditorium Stage

(Any projects not removed by 6:00 PM Saturday, March 17th, will be discarded.)



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The university won **\$472 million in research funding** in fiscal year 2011.

FOR MORE INFORMATION:

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Fax: 301.314.9693

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MONTGOMERY AREA SCIENCE FAIR ASSOCIATION

March 2012

Welcome to the Montgomery County Science Fair. We hope that developing a Science Fair project was not only a learning experience, but also an enjoyable one. ScienceMONTGOMERY congratulates the students who are participating in the 2012 Fair and applauds them for their hard work. We also wish to recognize and thank the parents, teachers and mentors who have supported and encouraged the participants. These adult sponsors are an essential part of the Fair program.

The Fair brings together scientists, engineers, mathematicians, educators, parents, and students from throughout the county. ScienceMONTGOMERY provides a single site venue for head to head competition among hundreds of students from public, private, and home school affiliations, in grades 6 through 12. We provide cash prizes for project excellence via our many Category Awards. Complementing these are the many Community Awards generously sponsored by various businesses, scientific, professional, and educational organizations, plus several US Government agencies. Students are competing for over \$40,000 worth of prizes, when totaled, in cash, scholarships, internships, travel, banquets, bonds, books, certificates, medals, and merchandise.

ScienceMONTGOMERY is a 503 (c) (3), nonprofit, all volunteer organization which relies on generous sponsors to fund the county wide fair competition each year. MedImmune, for the eighth consecutive year, serves as our premier sponsor for which we are most grateful. We also are very appreciative of the support of Human Genome Sciences, Northrop Grumman and United Therapeutics Corporation, and the generous returning sponsors Lockheed Martin, the Office of Dietary Supplements of the National Institutes of Health, and the U.S. Nuclear Regulatory Commission.

The all-volunteer ScienceMONTGOMERY Board of Directors wishes to thank each of the organizations and individuals you see listed in this program for making this Fair possible. Every year, we are indebted to the approximately 200 volunteer judges, representing area business and professional organizations, who painstakingly evaluate projects, and perhaps more importantly, encourage students' further pursuit of scientific understanding. My personal thanks goes out to each of the Board members who have contributed significant talent, time, and resources, late at night, after work, on weekends, in good weather and bad.

An affiliate of the Intel International Science and Engineering Fair (ISEF), ScienceMONTGOMERY follows the ISEF rules and guidelines to ensure the safety of our competing students. This year's top high school winners will be awarded a fully funded travel scholarship to present their project at the International Science and Engineering Fair, 2012 in Pittsburgh, PA.

Kate M. Baldwin, Ph.D.
Fair Director 2012



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OFFICE OF THE COUNTY EXECUTIVE
ROCKVILLE, MARYLAND 20850

Isiah Leggett
County Executive

March 2012



Dr. Kate Baldwin
Fair Director
ScienceMONTGOMERY
Montgomery Area Science Association
8613 Fenway Drive
Bethesda, Maryland 20817

Dear Dr. Baldwin:

Montgomery County supports and applauds *ScienceMONTGOMERY*, and your ongoing efforts to encourage interest in science throughout the County. Programs like yours help nurture and expand Montgomery County's longstanding national and international prominence in the life sciences and technology fields. The countywide Science Fair annually attracts over 400 Montgomery County public and private school students and we are very proud to support your mission to advance and celebrate performance in science education throughout our community.

Now more than ever, Montgomery County is doing all we can to ensure a strong, vibrant economy and healthy, sustainable communities today for future generations. Maintaining one of the nation's highest performing K-12 public school systems is essential to these goals, and the talented and dedicated students being recognized this year illustrate our success in this area.

I commend the important contributions you and *ScienceMONTGOMERY* make within the community, and applaud those businesses that, during these difficult economic times, pledged their support to recognize and honor the talents and achievement of our youth.

Sincerely,

Isiah Leggett
County Executive

www.montgomerycountymd.gov

**MONTGOMERY AREA SCIENCE FAIR ASSOCIATION**

56th Montgomery Area Science Fair – 2012
Reckord Armory, University of Maryland College Park

OFFICERS AND BOARD, MONTGOMERY AREA SCIENCE FAIR ASSOCIATION

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Teacher, Hoover Middle School

Treasurer: **Gary Cahn**
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Fair Director: **Dr. Kate Baldwin**
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Dr. Edward Kelty
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Teacher, Bethesda Chevy Chase High School

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Adventist Healthcare

Persons interested in joining the Science MONTGOMERY Board should contact FairDirector@sciencemontgomery.org



AWARDS PROGRAM

2:00 P. M.

Sunday, March 18, 2012

Watkins Mill High School Auditorium

Opening of Awards Program and Welcome to <i>Science</i>MONTGOMERY	Kate Baldwin, <i>Fair Director</i> Montgomery Area Science Fair Association
Presentation of Community Awards:	<i>Science</i> MONTGOMERY Board Members Community Award Organizations Presenters
Presentation of Category Awards:	<i>Science</i> MONTGOMERY Board Members
Engineering Awards Category Awards in Honor of Captain Greg Neuschafer	
Presentation of ISEF Awards:	Milton Axley, Ph.D.
Thank you and Adjournment	

SPECIAL FAIR RESPONSIBILITIES:

Venue and Food: Greg Neuschafer, James Douglas

Website Oversight: Gary Cahn

Category Awards: Kate Baldwin, *Chair*; Kenny Rosenberg

Community Awards: Ellen Kominers, *Chair*; Kuo-Kai Chin, Re-I Chin, Taylor Douglas, Josh Klontz, Bill Kominers, Anne Merrell, Greg Neuschafer, Reid Simon

Program: Susan Baker

Display and Safety Committee: Brett M. Huhman, *Chair*

Fund Raising: William Kominers, *Chair*

Scientific Review Committee: Laura Lee Johnson, *Chair*

Milton Axley, Kate Baldwin, Susan Baker, Luis Betancourt, David Bonnell, Gary Cahn, Christopher Cochran, Kevin Connolly, James Douglas, Taylor Douglas, Deborah Pober-Haase, Brett Huhman, Ellen Kominers, William Kominers, Cathryne Manner, Stephen Mason, Anne Merrell, Greg Neuschafer, Patricia Porter-Gill, Sikandar Porter-Gill, Kenny Rosenberg

ISEF Delegation Adults-in-Charge: Brett Huhman and Heather Huhman



Community Organizations Presenting Awards

Aerospace Corporation
American Industrial Hygiene Society—Potomac Section
American Institute of Aeronautics and Astronautics (AIAA)
American Meteorological Society—DC Chapter
American Nuclear Society, Washington, DC Section
American Physiological Society
American Psychological Association
American Society of Mechanical Engineers
ASM Materials Education Foundation—DC Chapter
Association for Women Geoscientists
Biophysical Society
Broadcom MASTERS Competition
Bud Miller Associates
Central Intelligence Agency
Chesapeake Water Environment Association
Clean Air Partners
Discovery Education 3M Young Scientist Challenge
Federal Water Quality Association
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GENIUS Olympiad—SUNY Oswego
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—Washington Section
IEEE Phototonics
Intel
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Lockheed Martin
MIT Club of Washington DC
MedImmune
MRIGlobal
Mu Alpha Theta
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National Society of Professional Engineers
National Space Club
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Office of Naval Research
Optical Society of America—National Capital Section
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Sigma Xi—NIST Chapter
Society for In Vitro Biology
Society of Manufacturing Engineers (SME)—Chapter 48
Stockholm Junior Water Prize
Surfrider Foundation—DC Chapter
Team Results USA
United States Air Force
United States Army
United States Metric Association
United States Nuclear Regulatory Commission
United States Public Health Service
—Commissioned Officers Association, D.C.
Washington Statistical Society
Yale Science and Engineering Association, Inc.



ScienceMONTGOMERY 2012 Update

Congratulations to our 2011 ScienceMONTGOMERY Grand (ISEF) Prize Winners

Julia Cline (Walt Whitman High)	Earth and Space Science
Austin Duff (Gaithersburg High)	Engineering
Daniel Liss (Charles E. Smith Jewish Day School)	Physics
Grace Zhang (Poolesville High)	Biology

We Proudly Announce that our Finalists were Recognized with These Awards at ISEF 2011 (Los Angeles):

Julia Cline: Air Force Research Laboratory (Second Award)
Daniel Liss: Air Force Research Laboratory (Second Award)

Kudos to These Members of our ScienceMONTGOMERY Family For Their Wonderful Accomplishments:

Maryland Junior Science and Humanities Symposium (First Place, Poster Competition): Daniel Liss

National Junior Science and Humanities Symposium (People's Choice Award): Daniel Liss

I-SWEEEP (Honorable Mention, Environmental Category): Kelly Kendall, Stephanie Golding

BroadCom MASTERS (Semi-Finalists): Shubham Chattopadhyay, Siddharth Nayak, Nina Simpkins, Frederick Xu

Davidson Fellows (Honorable Mention): Austin Duff

Siemens Competition in Math, Science, and Technology (Semi-Finalists): Pei-Nan Chen,
Maureen Lei, Nina Lu, Ziyao Wang, Andrew Zhang

Illinois Technology Association Fall Challenge Contest (First Place): Louis Wasserman

Digital Forensics Challenge 2011 (High School Division First Place Team member): Jack Zhu

Intel Science Talent Search 2012: (Semi-Finalists) Peinan Chen, Lori Kaufman, Maureen Lei, James Lewis Sheperdson,
Pavleen Thukral, Kevin Tyan, Andrew Zhang, Jack Zhu





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- ODS Staff



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Office of Dietary Supplements
National Institutes of Health
U.S. Department of Health & Human Services
Bethesda, Maryland



2012 Category and ISEF Awards Judges

Name	Affiliation	Name	Affiliation
Ms. Lauren Abell	NIH, NIDDK	Dr. Jonathan Hardis	NIST
Ms. Abolade Adepti		Dr. John Harvey	Samsung Techwin Biotechnology
Dr. Neeraj Agarwal		Mr. Mahalaleshwara Hegde	Adnet
Dr. Milt Axley	MedImmune	Ms. Vickie Henderson	U.S. DOJ
Mr. John Bagnoli	MRIGlobal	Dr. J. Terrell Hoffeld	Retired
Dr. Amy Belton	Johns Hopkins School of Medicine	Mr. Larry Hothem	
Dr. Chris Berndsen		Dr. William Iverson	MedImmune
Mrs. Savita Bhandari		Dr. Brian Jackson	Carnegie Dept. of Terrestrial Magnetism
Ms. Cathryn Blakley	UMCP Dept. of Chemistry and Biochemistry	Ms. Claire Kaplan	NIH
Dr. David Bonnell	NIST, retired	Dr. Priscilla Kelly	NIH
Dr. Patrick H. Brown	NIH	Dr. Miriam Kelty	Independent Consultant & NIH
Ms. Agatha Brzezinski		Dr. Indu Kohaar	NIH
Dr. Pepper Buckley		Dr. Daniel Krainak	FDA
Dr. Jay Buckley		Dr. William Lee	NRL
Ms. Kimberly Chau	NIH	Mr. Changwoo Lee	NIH/NCI
Dr. De Chen	NCI/SAIC - Frederick	Ms. Sue Lee	
Dr. Patricia Clay	NOAA Fisheries	Dr. Jae-Ho Lee	NIH
Ms. Jeanette Coffin	MRIGlobal	Dr. Ming Lei	
Ms. Stacey Cole	NIDCD/NIH	Dr. Sunil Lingayat	Northrop Grumman
Dr. Kevin Connolly	Independent consultant	Dr. Chunquai Liu	NIH/NEI
Dr. Hall Crannell	Retired	Ms. Ivy Liu	Lockheed Martin Corp.
Dr. Eric Czerwinski	QIAGEN	Ms. Heidi Lovett	NOAA
Mr. George Daniello		Mr. Marshall Lukacs	NIH/NIAID
Dr. Mathew Daniels	NIH	Dr. Jarrad Marles	NIH, NBBTP
Dr. Salil Das	Montgomery College	Mr. Joseph McKennan	SoBran/NIH
Ms. Eric Dashow	NIMH	Mr. Stephen McMurray	Technology Service Corp.
Dr. Jana Delfino	FDA	Mr. Karl Means	Shulman Rogers
Dr. Lena Diaw		Ms. Erin Merritt	MRIGlobal
Dr. Renee Donahue	NIH	Dr. Julia Michelotti	MRIGlobal
Mr. Jeff Durocher	QIAGEN	Mr. Scott Miller	QIAGEN
Dr. Meena Ekambaram		Mr. Stephen Mason	JHUAPL
Dr. Ines Elakhhal Naouar	FDA	Mr. Juan Molina	NIMH
Mr. Ron Engle	NIH	Ms. Davona Moore	QIAGEN
Dr. Gisela Ferreira	MedImmune	Mr. Ram Narula	
Dr. Andrew Flannery		Dr. Kapinga Ngalula	
Dr. Dionysis Foustoukos	Carnegie Inst. of Washington	Mr. Mostefa Nouh	UMCP Dept. of Chemistry & Biochemistry
Dr. Christine France	Smithsonian Institution	Dr. Jeff Owrutsky	NRL
Dr. Sarah Gaillot		Dr. Disha Pant	University of Maryland
Mrs. Mary Galloway		Dr. Stephen Parker	NIH
Dr. Eric Garber	US Government, FDA	Mr. Ed Pase	
Dr. Hui Geng	NIH	Dr. Carolyn Peluso	NIH/NICHD
Mr. Karl Goller	Retired, NRC	Dr. Robert Peters	
Mr. Jon Griffin		Ms. Nilda Piczon	Northrop Grumman Information Systems
Ms. Joy Gunter	Charles River Labs		
Dr. Subhash Gupta	U.S. Department of Agriculture		
Dr. Raziul Hakim	Howard University Emeritus		

**2012 Category and ISEF Awards Judges (continued)**

Name	Affiliation
Mr. Jason Pittman	Hollin Meadows Science & Math Focus School
Mr. Mohamed Raafat	
Dr. Savelas Rabb	NIST
Dr. Mangala Rao	Walter Reed Army Institute of Research
Ms. Lisa Read	MRIGlobal
Ms. Karine Reiter	
Ms. Nattali Rodriguez	NIMH
Dr. Jermaine Ross	
Dr. Adam Ruben	Sanaria Inc.
Mr. Martin Rush	Retired, IBM, BBN, MIT Instrumentation Lab
Ms. Ashley Shaloo	
Dr. Sanjiv Shresta	MITRE Corporation
Mr. Malcolm Smith	MRIGlobal
Ms. Kendra Smyth	University of Maryland
Ms. Katie Soe	NIH
Dr. Michael Sparks	U.S. Dep't of Agriculture
Dr. Mridula Srinivasan	National Marine Fisheries Service/NOAA

Name	Affiliation
Dr. Shireesh Srivastava	
Dr. Daniel Stark	NIST
Ms. Danielle Swales	MRIGlobal
Mr. McAnthony Tarway	NIH
Ms. Katherine Tolley	MRIGlobal
Dr. David Tomko	NASA
Dr. Gil Toombes	
Ms. Tresa Vidayathil	
Mr. Maximiliano Villagra	QIAGEN
Ms. Monicah Wainaina	Information Technology
Dr. Tanchun Wang	
Mr. Jason Weed	NIH
Dr. Jason Weil	US Court of Appeals for the Federal Circuit
Mrs. Amy Weil	The Johns Hopkins University
Dr. Marlena Wilson	NIH
Dr. Sadhana Yavasani	Denovo Biotechnology
Dr. Huaying Zhao	NIH
Dr. Chan-Ying Zheng	NIH

ScienceMONTGOMERY Participating Schools-2012

School	Abbrev.
Argyle Middle School	AGM
Bethesda-Chevy Chase High School	BCH
Bullis School	BUS
Charles E. Smith Jewish Day School	JDS
Col. Zadok Magruder High School	MGH
Eastern Middle School	ESM
Forcey Christain Middle School	FCM
Gaithersburg High School	GBH
Georgetown Preparatory School	GPS
Herbert Hoover Middle School	HHM
Holy Cross School	HCS
Home Schooled	HS
John H. Poole Middle School	JPM
Julis West Middle School	JWM
Lakeland Middle School	LPM
Melvin Berman Hebrew Academy	MBHA
Montgomery Blair High School	BLH
Muslim Community School	MCS
North Bethesda Middle School	NBM

School	Abbrev.
Parkland Middle School	PLM
Poolesville High School	POH
Richard Montgomery High School	RMH
Robert Frost Middle School	RFM
Roberto Clemente Middle School	RCM
Rockville High School	ROH
Rocky Hill Middle School	ROM
Sherwood High School	SWH
Sligo Middle School	SLM
St. Andrew Apostle School	SAA
St. Bernadette School	SBS
St. Catherine Laboure School	SCL
Takoma Park Middle School	TPM
Thomas S. Wootton High School	WHO
Walt Whitman High School	WWH
Walter Johnson High School	WJH
Wheaton High School	WHH
White Oak Middle School	WOM
Winston Churchill High School	CHH

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**Congratulations to
ScienceMONTGOMERY 2012:
The 56th Annual
Montgomery County Science Fair
Best Wishes from the
Kominers Family:
Bill, Ellen,
Paul (ScienceMONTGOMERY 2006–2008), and
Scott (ScienceMONTGOMERY 2005)**

PH rockwood

Dr. Roscoe M. Moore, Jr.
Assistant United States Surgeon General (Retired)

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STUDENTS IN THE JUNIOR FAIR

BEHAVIORAL AND SOCIAL SCIENCES

J101	Life Tastes Sweet	Molly Hutchison	HCS
J102	The Effect of Visual Distractions on The Human Mind	Eric Xu Kevin Liu	RCM RCM
J103	Multitasking: Teens and Adults	Chuan Chen	RCM
J104	Fat vs. Low-Fat Dairy	Ron Yutin	RCM
J105	What Do You See?	Morgan Ross	RCM
J106	Do Video Games Affect Reaction Times	Kevin Hu	RCM
J107	Circadian Changes	Lainey Reed	RCM
J108	Mirror, Mirror: An Analysis of Beauty and Its Correlation to Self-Esteem	Brittany Menjivar	HCS
J109	The Perceptual Journey of Humans Against Death	Harish Kumar	RCM
J110	Exercise for a Prize!	Jahnvi Muralidharan	PLM
J111	Pretzel Party	Parrish Stinson	TPM
J112	To Smell or Not to Smell? That is the Tasty Question	Cecelia Lamancusa Nicole Dorado	FCMS FCMS
J113	The Effect of Quantity of Information on Decisions	David Miller	TPM
J114	What Affects the Ability of Someone to Find an Embedded Object?	Azeem Mohammed	RCM
J115	Ars Memorativa: the Art of Memory how Different Methods of Memorization Affect the Number of Digits and Words Memorized	Alex Miao	TPM
J116	Estimating Time	Delia Chen	RCM
J117	What Are the Reactions By Humans When Smelling Different Substances?	Alessandro Arias Salazar	TPM
J118	Does Music Improve or Hinder Memory?	Ellie Burlinson	TPM
J119	Flu Vaccination Rates Among Healthcare Providers	Mehana Daftary	ESM
J120	Missing	Chirstian Durante	RCM
J121	What Really Scares People?	Clayton Gibb Dominic Massimino	TPM TPM
J122	How Sleep Affects the Human Brain	Vinni Javier	WOM
J123	Do Men or Women Have Better Memories?	Angie M. Urquizo	TPM
J124	The Effect of Variable Times of Playing Video Games on Reaction Speeds	James Mackall	TPM
J125	Do People Genuinely Smile When they Smile at You or Are they Faking?	Salimatu Mankajang	TPM
J126	Does Dizziness Affect Your Perception of Optical Illusions?	Michael Moore II	TPM
J127	Smilin' Faces: Are You Really Smiling or Smirking at Me?	Jessie Nelson	TPM
J128	The Effect of Music on Autistic Children	Howard Nicholson Cooper Teich	RCM RCM
J129	How Does Aging Affect Memory Loss	Kathryn Ozeroff	TPM
J130	The Effect of Color on Memory	Irene Park	TPM
J131	How Does Sleep Deprivation Affect a Person's Endurance?	Bana Petros	TPM
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J133	Can Distracting a Person in Pain Reduce their Agony?	Seamus Swyers	TPM

BIOLOGY

J201	The Best Fertilizer	Christina Zhang	RCM
J202	The Effect of Electromagnetic Radiation on Plant Growth	Ankita Sharma	RCM



J203	Recycling Greywater	Sunil Tohan	RCM
J204	Plants and Soil Effects	Jabeen Fatima	RCM
J205	Plant Growth	Milton Flores	PLM
J206	Polluted Plants: How Nitrogen Affects the Growth of Plants	Ephraim Gardner	PLM
J207	What Type of Music Most Affects Plant Growth?	Jennifer Belson	JDS
J208	Does an Exotic Angel Plant Arch Its Stem to Get Light	Daniel Cho	RCM
J209	Leaf Those Trees Alone!	Rachel Pastel	PLM
J210	How Does Acid Rain Affect Plant's Growth	Shahzaade Bledsoe	PLM
J211	How Do Plants Produce Oxygen?	Bisrat Asfaw	TPM
J212	How Do Different Packages Affect the Freshness of Fruit?	Prince Hunt	TPM
J213	The Effect of The Circadian Cycle on Dinoflagellates P. fusiformis	Stephanie Jiang	TPM
J214	The Effect of Ocean Acidification on the Weights of Calcium Carbonate Shells	Angela Park	TPM
		Yannie Mei	TPM
		Lucy Wen	TPM
J215	Do Plants Grow Differently When Placed in Other Locations?	Nakry Rath	TPM
		Bemnete Teferi	TPM
J216	Investigating the Correlation Between the Turbidity of Milk and Its Nutritional Value	Pratik Rathore	TPM
J217	Which Type of Soil Will Allow Black Eyed Susan Seeds to Grow the Best?	Glenn Ren	RCM
J218	Do Pollutants Affect the Movement of Water Through Xylem Tissue in Carnations	Leila Riazi	Other
J219	Which Foods or Fruits Contain the Most Acid? Salt?	Isha Sarr	TPM
		Carmen Morales	TPM
J221	How Green Is Your Green Detergent	Sanyukta Deshmukh	RFM
J222	The Effects of Hydroponics Systems on Plant Height	Chase Martin	PLM
J223	How Does the Amount of Fertilizer Affect the Plant Growth?	Rachel Qian	RCM
J224	How Does the Amount of Magnetite in Soil Affect Plant Growth in Lettuce?	Caroline Leng	RCM
J225	The Effect of Water on the Direction of Plant Root	Julio Rivas	PLM
J226	Plants Growing in Different Conditions	Jonathan D'Alessio	FCMS
		Zuriel Herran	FCMS
J227	Study of Plants	Antonella Malca	RCM
J228	Sundews, Lids, and Dead Flies	Jack Ahrens	RCM
J229	The Effect of the Different Colors of Light on the Growth of Plants	Kevin Boby	RCM
J230	Liquids in Seed Germination	Alicia Gordon	RCM
J231	What Causes Death? How Have Death Rates Changed Over the Past 20 Years?	Yared Tebabu	TPM
J232	Exploring the Properties of Yeast Through Baking	Isabella Vazirani	SBS
J233	Is a Dog's Mouth Cleaner Than a Human's Mouth?	Hannah Verschell	TPM
J234	The Science of Whip Grafting and How We Did It	Maggie Warnick	SBS
		Maddie Rodgers	SBS
J236	How Vitamins Affect Plants	Leigh-Anne Worthington	Other
		Katie Weinshimer	Other
J237	Watering Differently	Michael Zhan	RCM
J238	Fruit Juice and Corn	Natalie Zhang	RCM
		Seema Snitkovsky	RCM
J239	Plant Food	Zhang Christina	RCM
J241	Stink Bug, Don't Bother Me	Catherine Paxton	HCS
J242	The Affect of Food on Blood Sugar	Asha Kodan	PLM
J243	What Drinks Cause a Tooth Tissue Issue?	Anthony Estime	SAA
		Matteo Patzy	SAA



J244	A Tasty Enemy	Kaitlin OuYang	PLM
J245	Enzyme Inhibition - Implications for Disease Control	Anthony Li	TPM
J246	Human Body As Bio-battery	Saiteja Tammali	LPM
J247	Favorable Soil Conditions for Living organisms	Nihar Gupte	RCM
J248	Effect of Cell Growth Supplements on Healing and Regeneration of Planaria	Shraeya Madhu	RCM
J249	The Effect of Magnetic Fields on Tunneling Activity in Western Harvester Ants (Pogonomyrmex occidentalis)	Griffin Badalamente	TPM
J250	Can Caffeine Stunt Your Growth	Zach Hicks	PLM
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		Cynthia Song	RCM
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J254	Are Fingerprint Patterns Inherited?	Cathryanna Dorsey	HCS
J255	Missing	Summ Goh	TPM
J256	Evolution of Bacteria With Different Temperatures	Aidan Graver	RCM
J257	HIV Research: How Does the Immune System Work?	Hilina Haile	TPM
		Lillian Bizuru	TPM
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		Claudia Burlinson	TPM
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J269	The Immunity of E. coli	Abby Beeler	RCM
J270	Cleaner Energy in a Bucket of Mud? The Effect of Anodal Surface Area in a Microbial Fuel Cell on Wattage and Carbon Dioxide Output	Maxwell Frankfurter	PLM

CHEMISTRY

J301	Nail Rusting	Bianca Dominguez	SCL
		Alexia Camacho	SCL
		Alejandra Ramirez	SCL
J302	Invisible Ink	Katherine Martin	PLM
J303	The Effect of Baking Soda & Vinegar in a Balloon	Jocelyn Martin	PLM
J304	Plop Plop, Fizz Fizz!	Divya Gandla	RCM
J305	The Effects of Heat on a Chemical Reaction	Jessica Bhattacharyya	RCM
J306	Which Combination of Household Surfactants and Thickener Makes the Best Bubbles?	Stuti Ganatra	RCM
J307	How to Make Homemade Pure Crystals	Hameed Siddiqui	RCM
J308	Baking Soda and Vinegar to the Extreme	Alec Schlenoff	RCM
J309	Which Insulator Keeps Heat Out the Best?	Noa Schisterman	JDS



J310	Temperature Effect on Glow Sticks	Raviteja Kemburu	RCM
J311	Relation Between Carbon Dioxide and pH	Dhanush Parasa	AGM
J312	Corroding Metals	Saul Sallah	RCM
		Jeong Yang	RCM
J313	What Is the Hardest Water?	Kevin Merrell	RCM
J314	The Amazing Crystals	Jocelyn Murillo	WOM
J315	What Is Slime Made of?	Shianne Bush	TPM
J316	Groovy Brownies	Renee Davall	PLM
J317	The Effect of Humidity and Temperature on the Time It Takes the Bubble to Pop	Maya Griffith	TPM
J318	Diet Soda vs. Regular Soda	Kyle Kirlew	RCM
J319	Acid and Fruit	Joshua Lebedinsky	RCM
J321	Without a Trace	Julia Condron	HCS
J322	Best of the Detergents	Chris Park	RCM
J323	pH Testing With Acidic Water	Karan Chawla	RCM
J324	Which Solvent Works Best?	Robert Boies	SAA
J325	Drippy Drawers	Devon Lyons	HCS
J326	Citrus Cleaners!	Nivedhitha Kishore	PLM
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J328	How Does Acidity in Citrus Fruits Affect their Taste and the Electricity they Generate?	Chimaoge Ibe	SAA
J329	Comparing Electrical Output of Various Common Fruits and Vegetables	Jesse Matthews	TPM
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		Alex Frost	RCM
J331	What Type of orange Juice Has the Most Vitamin C?	Rohith Battina	RCM
J332	Bio-battery	Kevin Zong	RCM
J333	Do Different Fruits Have Different Voltages?	Jeremy Gagnon	TPM
J334	Simulate Your Senses	Mindy Hernandez	PLM
J335	Hey! There's Corn in My Candy	Michelle Vaca	SAA
		Katherine Muolo	SAA
J336	Glow in Dark Secret	Alan Monroy	WOM
J337	Growing Copper Sulfate Crystals	Ebun Olunuga	FCMS
		Milena Chapin	FCMS
		Sarah Nelson	FCMS
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		Emily Wang	RCM
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		Sylvana Aho	RCM
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		Catherine Estrada	SCL
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		Kate Andre	SLM
		Tolu Olobayo	SLM
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J371	Gold to Black Sand	Riley Wilburn	RCM
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J374	Sequestering of Carbon Dioxide By Chemical Reagents: A Possible Approach for Greenhouse Gas Emission	Vishnu Dharmaraj	TPM
J375	The State of Maryland Has a Healthy Environment, or Does It?	Henri Maindidze	RCM
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J404	A Research of Algorithm Run Time in Statistical Analysis of a Simulated Model	Jonathan Ni	RCM
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J411	How Does the Angle of a Reflective Surface Around an Internet Router Affect the Internet Signal	Alex Trang	PLM
J412	Does Changing the Size of the File Type Effect the Final Paper Product?	Suyaib Ahmed	TPM
J413	Does the Type of Liquid Change an Egg's Circumference?	Jarrell Jones	TPM

ENGINEERING

J501	Rock Hard Concrete	Najma Thomas	PLM
J502	The Effect of Terrain Type on the Stability of a Structure	Jeremy Jubilee	RCM
J503	The Power of Sound	Kalin Vassilev	TPM
J504	Fluid Powered	Aaron Landis	PLM
J505	Bridge Supports!	McCauley Peters	SCL
J506	The Efficiency of a Bridge Design	Brandon On	PLM
J507	Designing Houses	Klent Marl Queja	PLM
J508	Efficiency of Bridges	Oscar Gonzales	PLM
J509	Effect of Wind on Building Structures	Ninad R. Nirgudkar	RCM
J510	What Is the Strongest Shape?	John Baur	TPM
J511	Metal Corrosion	Maristela Romero	RCM
J512	Strength of Wood	James Pierre	PLM
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J515	The Effect of Materials on the Electric Fields They Create	Serena Debesai	TPM
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J517	How Temperature Affects the Strength of Electromagnets	Paul Han Javier Arias Anthony McCants	FCMS FCMS FCMS
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J519	Hover Boots	Otto Keiser	WOM
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J523	Testing 3-Dimensional Drag on Winglets	Andrew Lent	RCM
J524	The Ultimate Energy Showdown; Hydropower Versus Wind Power	Zack Khan	PLM
J525	Airfoil Design	Joshua Werfel	PLM
J526	The Rate of Rotation	Seong-Joon Yoo Kevin Ying	RCM RCM
J527	Development of an Experiment to Study Wakes From Submerged Bodies	John Lathrop	TPM



J528	The Effect of Angle on Drag	David Adeleke	PLM
J529	The Effects of Pressure on Power	Declan Rickards-Blaeuer	PLM
J530	Which Insulation Works Best for Sound Resistance?	Nicholas Hopwood	RCM
J531	The Turtle Neck Syndrome and Its Counter-Measures	Young Joon Kim	RFM
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		Dyaln Sylvester	SAA
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J548	Crystal Radio	Anish Senapati	TPM
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		Mollie Stern	NBM
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J701	Sink or Float	Scott Obendorfer	RCM
J702	Swimming Slower	Elise Mitchell	HCS
J703	Wind Turbines	Shreya Singh	RCM



J704	Aerodynamics of Paper Airplanes	Richard Wang	RCM
J705	The Effect of Parachute Design on Rate of Descent	Cynthia Liu	RCM
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J714	How Fast Is Your Car?	Raynolds Awusi	WOM
J715	Darkness + Time=?	Noel Camello	PLM
J716	Amazing Bottle Rocket	Daniel Escobar	WOM
J717	How Far a Balloon Travels in Sizes	Antonio Escobar	WOM
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J719	The Effects of Sweeteners on the Buoyancy of Soda	Divya John	TPM
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J733	Melting Ice Cream	Anh Pham	HCS
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J784	Mpemba Effect	Matthew Feng	RCM
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**BIOLOGY**

S201	Role of TGF- β in Liver Injury Induced By Chronic Alcohol Consumption	Daniel Cheng	RMH
S202	Investigation of Antibiotic Resistance in <i>Orientia tsutsugamushi</i>	Tiffany Le	POH
S203	Role of Omega-Polyunsaturated Fatty Acids in Apoptosis in Heart Failure and Cancer	Srividya Murthy	BLH
S204	Determination of Binding Energy Hotspots on a Broadly-Neutralizing Antibody Against HIV-1	Nina Lu	BLH
S205	Identification of Genes Essential to Mammary Gland Development in Mice By Transcriptome Analysis of Induced Pluripotent Stem Cells	Andrew Zhang	BLH
S206	How Natural therapies Affect the Level of Astigmatism in the Human Eye	Aarti Hinduja	POH
S207	Identifying Sugar Nutrient Based on Bacterial Growth	Phillip Christman	MGH
S208	Typing in Bacteria?	Ingyum Kim	POH
S209	Discovery of the Gastric Ulcer	Kuanwei Lee Qingchuan Liu	GPS GPS
S211	Mapping the Oif Phenotype in <i>Arabidopsis</i> With and Without the Use of the Enhancer Gene SR-45	Sriramya Ayyagari Zev Medoff Andrea Canales	POH MBHA BLH
S212	Evolution of Gene Structures in Ciliates Species	Niti Dharwadkar	POH
S213	Barn Conditions Effect on Rain Rot	Maggie Dillon	WHO
S214	Comparison of NF1 Case Reports Referencing Pain and Patients With NF1 Treated for Pain	Rebecca Hughes	WWH
S215	Does Caffeine Affect Plant Growth	Hannah Josovitz	JDS

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S216	The Geographic Genetic Variation and Evolution of the Woodland Salamanders in the Plethodon Wehrlei Group	Damini Kunwar	POH
S217	Induction of Cyr61 Protein in Prostate Carcinoma PC-3 Cells	David Lee	POH
S218	Parallel Culture and Comparison of Two Biofuel Microalgal Strains (<i>C. vulgaris</i> , <i>B. braunii</i>)	Robert Luo	POH
S219	Characterization of Isogenic Mutants in <i>Shigella flexneri</i> 3a Strain J17B	Namrata Mohanty	POH
S221	Bacterial Collective Defense Against Lytic Bacteriophage	Eric Keen	HS
S222	Water Purification	Colin Hambright Adam Berger	SWH SWH
S223	Blood Pressure vs. Race	Josh Drucker Daniel Martinez	SWH SWH
S224	Determining the Effect of the Protein AGAP3 on Endocytosis	Nadia Abutaleb	POH
S225	Discovering the Connection Between Met Mutations and Kidney Cancer	Tiffany Wong	POH
S226	Simultaneous Inhibition of SRC and STAT3 As a Novel Therapeutic Strategy in Prostate Cancer	Sherman Leung	BLH
S227	Effect of Exercise on CO2 Levels Exhaled	Sreejan Kumar Dean Dao	POH POH
S228	Bacteria on Artificial and Natural Turf	Evan Horne	BLH
S229	Non-Invasive Methods for Measuring Tumor Cells in Solid Tumor Patients With Metastatic Disease	Kevin Tyan	WWH
S231	An fMRI Investigation of a Measure of Psychopathic Traits and Its Relationship to Prediction Error in Healthy Adults	Shane Nicholls	POH
S232	The Effect of an Electric Field on Apple Browning	Ashwin Raghavachari	WHO
S233	How to Make Meat Safer for Consumers	Sara Salimi	MCS
S234	Acne Medication and Bacteria	Maryam Sizar	MCS
S235	Integration of Imaging and Systems Biology to Study the Treatment of Medulloblastoma	Sean Wang	POH
S241	Investigation of Liposome Loading Methods for Targeted Drug Delivery	Edward Liang	POH
S242	Investigation of Transgenic T Cell Receptor Against Survivin and Its Potential Contribution to Leukemogenesis	Ziyao Wang	BLH
S243	Predicting Gene Expression Using Promoter Sequence Characteristics	James Shepherdson	BLH
S244	Coding Nucleotides in DNA for Proteins: Are All Amino Acids Represented Equally?	Trinish Chatterjee	RMH
S245	Use of a Red Fluorescent Protein to Evaluate Gene Expression in Live Zebrafish Embryos	Kyle Starost Waliullah Rifai	MGH MGH
S246	Finding Potentially Monoallelically Expressed (imprinting) Transcripts on the X Chromosome	Jaykar Nayeck	WWH
S247	Prevalent Contamination of U.S. Water Sources With Biologically Active Glucocorticoids and androgens	Daniel Sack	WWH
S248	The Effect of STAT1 Removal on the Function of Plasmacytoid Dendritic Cells	Nicholas Tosini	WWH
S249	Investigating the Efficacy of Transcription Factor STAT3 Targeting Drugs Selected Through Computational Strategies	Melodi Anahtar	BLH
S261	The Effects of Potato Leafhopper Feedings on Shaved Soybeans: Photosynthesis	Joseph Denicola	POH
S262	The Effects of Plant Sterols on the Growth of Brine Shrimp	Connie Yeung	WHO
S263	Radiation Effects on Shrimp Health	Betsy Tang	POH
S264	Extraction of DNA from Fruits and Vegetables	Sushmitha Tamilselvan	ROH
S265	Stomata in Crassulacean Acid Metabolism Plants	Emma Poe-Yamagata Amanda Tomlinson	SWH SWH
S266	The Effects of El Niño and La Niña on Algae Growth in the Chesapeake Bay	Mohamed Keita	GBH
S267	The Effect of the Type of Fruit and Vegetable on Glucose Levels	Ramitha Manivannan	WHO
S268	The Effects of Metal Absorption on Tomato Plants	Tristan Kindig Andrew Huang	WWH WWH
S269	Rain Gardens and Hydrocarbons	Prusse Kakpovi	BLH



S270	Sulforaphane and Enzyme Activity in Cruciferous Vegetables	Ellil Krishnaraju	WHO
S271	The Effect of Genetically Modified (gm) Corn Seeds on the Rate of Enzyme Activity	Yini Qi	WHO
S272	Crickets in a Maze	Nadja Bzhilyanskaya	POH
S273	Caffeinated Amphibians	Harrison Reed Billy Saturno	BLH BLH

CHEMISTRY

S301	Why Microwaves Heat Some Liquids and Not Other Liquids	Katherine Brizzolara	WJH
S302	pH Testing	Rahul Navale	SWH
S303	Electrolysis of Water	Carmelita Ugarte Kenya Platero	SWH SWH
S304	The Effect of Ripening Bananas (organic vs. Conventional) on Change in Sugar Content	Sharon Wu	WHO
S305	Impact of Changes in Future Anthropogenic Aerosol Emissions on Northern Hemispheric Regional Air Quality and Climate	Maureen Lei	BLH
S306	An Alternate Sunscreen	Devika Haridas	POH
S307	Extraction of Diesel Without the Use of Methanol	Krishna Gajjala Abhigya Giri Dennis Wang	POH POH POH
S308	Measuring Salinity of Different Water Types Using Light Refraction	Navya Nanda Meera Krishnamoorthy	POH POH
S309	Extraction of Carbon Dioxide From the Air Around	Caleb Fan	POH
S310	Comparison of the Concentration of Hydrocarbons in Storm Water Runoff: Paved Surfaces vs. Soiled Plots	Emanuel Russom	BLH
S311	Homegrown Pigments: Paint Made From Materials Found Around the Neighborhood	Caroline Greer Grace Zhang	POH POH

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S312	How Will Global Warming Affect Oxidation?	John Hartwell Jeffrey Wang	POH POH
S313	Biodiesels	Alexander Liu Donald Hong Jenny Lee	SWH SWH SWH
S314	Design Considerations of Swirling Entrained Flow Gasifier and Effect of Reactor Temperature	Quan Dao	POH
S315	Sugars in Honey and their Temperature Dependent Solubility Studies	Matthew Guo	POH
S316	Converting Carbon Dioxide Into Safer Compounds	Garrett Healy	CHH
S317	Structural Implications of E. coli and Neiseria meningitidis	Zachary Kramer	WWH
S318	Droplet Generation in Flow-focusing Microfluidic Systems for the Creation of Artificial Cells	Weilong Li	POH

COMPUTER SCIENCE

S401	Analysis of Iteration Formulas for Computing the Mandelbrot Set	Dhruv Shankar	POH
S402	Measuring the Real Size of Objects on a Digital Image Using Digital Image Processing Techniques	Toby Kang	CHH
S403	Implementing Compression and URL Forwarding With Adaptive Web Caching	Anirudh Gubba	POH
S404	Hierarchical Automatic Image Based Human Age Estimation Using Relevance Vector Machine Regression and Multi-Classifer Fusion	Pavleen Thukral	POH
S405	Helping the Red-Green Color-Blind Cross Traffic... Using a Computer Program	Angela Li	POH
S406	Creating E-Learning Lessons Using Dynamic E-Learning Software	Ayush Goyal André Guzmán Aakarshan Bhardwaj	POH POH POH
S407	Cross-Database Querying Methods to Estimate Protein Binding Affinity	Eric Harrison	POH
S408	An Information Engine to Provide an Open Data Protocol (XML), With Extensible Interface for Dynamic Queries and Computations	Shubham Chattopadhyay	BLH
S409	A Cost Effective Micro Controller Driven Ambient Light Sensor for Daylight Harvesting	Arun Dilipan	POH
S410	Incorporating Physics in Video Games	Derek Zhang Jesse Lee	POH POH
S411	The Rubik's Cube Challenge	William Gu	POH
S413	Evaluating the Performance of Automated Particle Analysis By SEM/EDX	Jaideep Bhargava	POH
S414	Pressure in Gases	Tucker Canary	BLH
S415	Maps for the Simplification of Navigation in Three Dimensions	Kevin Harrison	POH
S416	Art vs. Science: Digital Facial Reconstruction	Jonathan Hunter	CHH
S417	Software Development for an Autonomous Unmanned Ground Vehicle to Function As a Member of a Swarming Robotics Demonstration	James Palmer	POH
S418	Three Proofs of the Hypergraph Ramsey theorem	Sandow Sinai	POH
S421	Modeling Photodiode Detector Non-Uniformities	Jennifer Gagner	CHH
S422	Application of Bayes Theorem to De-noise One-Dimensional Data	Rahul Menon Dennis Levin	POH POH
S423	Quantitative Modeling of Processing Cost and Energy Consumption for Cryptographically Enhanced Secure Internet Routing Protocol	Vinay Sriram	POH
S424	Recreating a Super-Outbreak: An Analysis of WRF and Severe Weather	Nikita Shalimov	WHO
S425	Using Stella to Model Future Changes in the Frequency of Volcanic Eruptions in the Pacific Northwest Resulting From Global Warming	Denise Alving	POH
S426	Return on Investment for Undergraduate Education	Pushkar Aggarwal	POH
S427	Web-Based Flexible Data Reduction for Neutron Reflectometry	Brendan Rowan	POH
S428	Investigating Benford's Law	Andrew Wang	POH
S429	Electro-Lights	Christopher Thompson Joey Smiga	POH POH



ENGINEERING

S501	The Original Theremin	Brandon Grinkemeyer	POH
S502	Power Transmission Above Ground Versus Below Ground	James Baur	WHH
S503	Novel Silicon/Carbon Nanotube Hybrid Anode Material for Lithium Ion Batteries	Caroline Park	WWH
S504	Using an Arduino to Build an Infrared Harp Using PIR Sensors	Mughil Muthupari	POH
S505	When Will the Shaking Stop?	Stephen Lee	CHH
S506	The Cubic Feet Per Minute Rating of a Fan vs. Temperature Inside a Computer Case	Satvik Mishra	WHO
S507	Holography Using Modulated Light: Part 2 - Implementation	Daniel Liss	JDS
S508	Optical Measurement of Ice Thickness	Jacob Glueck	WHO
S509	Model of Stress on Knees	Luna Homsy	POH
S510	Analysis of Electrostatic Charge on Small-arms Projectiles	Jack Zhu	POH
S511	Mission Geiger: Radiation	Rachel Chang	POH
		Nikita Salker	POH
		Swagata Patnaik	POH
S512	What Is the Effect of Changing the Size of a Biefeld-Brown Lifter on Its Efficiency?	Rishi Banerjee	POH
S513	Testing for Excess Cell Phone Radiation: The Radialert	Asma Azam	POH
S514	Shape of Shoe Sole for Maximum Traction	Dave Qin	POH
S515	Experimentation With Beads and Capsules	Matthew Bird	POH
S516	Quantitative Assessment of the Improvements on Robot Mapping From slam Relative to Dead Reckoning Through Base-Case Map Scenarios	Haris Godil	POH
		Neil Davey	BLH
S517	Sol Et Aqua	Kiernan Hahn	BUS
S518	DC Range Gain Error of a High Speed Digital Voltmeter at Low Frequencies	Catherine Lozier	POH



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S519	Development of High-Throughput Protein Expression Technology for Large-Scale Genomic Studies of HIV-1 Neutralizing Antibodies	Gabriel Lu	POH
S520	Wireless Communication Between TI Calculators	Umesh Padia	POH
S521	Tabletop Rheology Using Vial Inversion Test	Rahul Rangunathan	POH
S522	Can the Fluorescent Tobacco Mosaic Virus Structure Increase Dye Sensitized Solar Cell Efficiency?	Ekaterina Tolstaya	POH

PHYSICS

S701	Unraveling the Mysteries of the Van de Graff Generator	Yogith Tupakula Elan Guzman Muqet Ahmad	POH POH POH
S702	Electromagnetism x3	Rahul Kaushal Arun Kaipuzha Zachary Broderick	SWH SWH SWH
S703	Frequency Based Microcantilever Oscillation Noise Analysis in a Ferromagnetic Resonance Force Microscope	Justin Yu	BLH
S704	A Multi-Satellite Approach to Studying Auroral Kilometric Radiation Using the Virtual Wave Observatory	Huy Lam	POH
S705	Sodium Abundance in Sungrazing Comets	David Zhang	RMH
S706	The Colors of Lightbulbs	Leo Hendricks	POH
S707	The Effect of the Concentration of an Optically Active Molecule on the Angle of Polarization	Shanta Murthy	POH
S708	Using a Laser to Measure a Fluid's Velocity	William Wang	POH
S709	Radiation Shielding	Amit Millo	WWH
S710	Good Bye Air Pollution	Saimouli Katragadda	GBH



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*We invite all ScienceMONTGOMERY alumni to join us as volunteers at future fairs.
To volunteer, email alumni@sciencemontgomery.org*



S711	Superconductor Magic	Amir Alwali Nathan Bick Bill Kamba	BCH BCH BCH
S713	Characterizing the Thermal Frequency Response of Calorimeter Vessels Due to Conduction and Incipient Convection	Anuradha Banerjee	POH
S714	Extending the Phase Diagram of Methane to Extreme Conditions	Peinan Chen	POH
S715	Analysis and Evaluation of the Modern Era Retrospective-Analysis for Research and Applications (MERRA)	Daniel Kendix	BLH
S716	Achieving Quantum Criticality in the Spin-density Wave Metal FeAs With Ni Substitution	Barbara Kim	POH
S717	Neutron Reflection Conditions for Magnetic Lattice and Symmetry Operations	Daniel Sun	POH
S718	Designing a Universe	Craig Weiss	SWH
S721	The Physics of the Diabolo	Pei-Yi Lin	POH
S722	Which Type of Tennis Court Allows the Fastest Serve After the Bounce	Archis Sathe	POH
S723	Testing Friction of Surfaces on Soccer Balls	Brian Galfond	POH
S724	Correlation Between Temperature and Coefficient of Friction	Jason Luu	POH
S725	Fatal Impact	Rodrigo Salamana Gaurav Sakhawala	POH POH
S726	Investigation of Real-Space Interlayer Coupling for Twisted Bilayer Graphene	Valery Leng	POH
S727	The Effect of Standing Water on the Distance a Baseball is Hit	Matthew Yung	WHO
S728	When is the Optimal Time to Fly a Small, Low Flying Airplane Over Different Oceans of the World?	Adarsh Bindiganavele Prajwal Keranahalli	POH POH
S729	Which Wing Design Creates the Greatest Lift?	Abhas Arya	BCH



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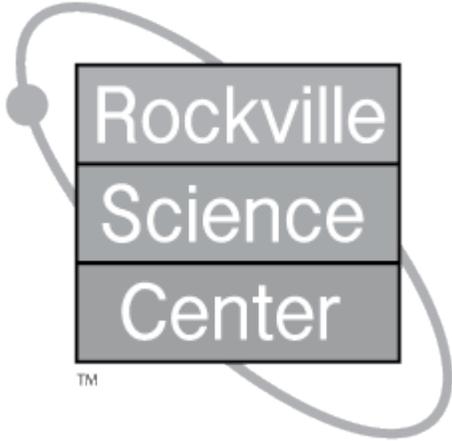


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