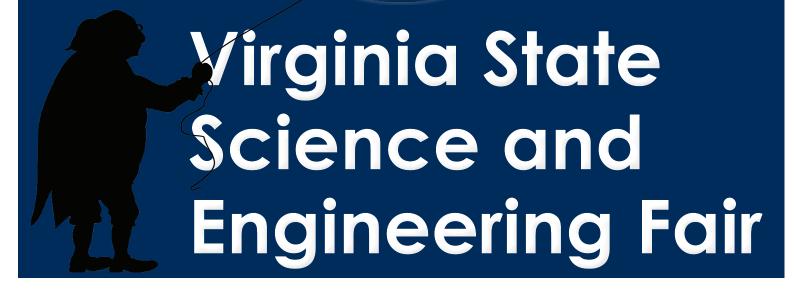


Virginia Military Institute

Marshall Hall
Center for Leadership & Ethics
Lexington, Virginia



28th Annual





Dear Virginia State Science and Engineering Fair Guests,

On behalf of the faculty, staff and Corps of Cadets, I would like to welcome you to the Virginia Military Institute and to the Virginia State Science and Engineering Fair. It is our distinct pleasure to host VSSEF in 2013, 2014, and 2015 and we are excited to support some of the commonwealth's brightest young minds in science, technology, engineering, and mathematics (STEM).

Hosting the fair is one of several initiatives at the Institute, all designed to increase focus and improve student preparedness for careers in STEM. Last fall we held the first of three STEM education conferences at VMI. The second will be held on 8-10 October 2013.

We are delighted to announce the naming of the fair grand prize award "The Governor's Award and Grand Prize." Virginia's Secretary of Technology, Jim Duffey, will present the award on behalf of Governor Bob McDonnell. We are also pleased to announce that cash awards will be given to category winners.

Joining you today are more than 200 students representing 11 regional fairs that have been held this spring across Virginia. Our VSSEF judges, bringing the expertise from public and private sector organizations, are here to show their commitment and support of the next generation of scientists and engineers.

The students whose projects are competing here have worked hard to get to this point. We commend them for their efforts. Congratulations on the successful completion of extraordinary research and best of luck today!

Sincerely,

General J.H. Binford Peay III, (Retired), U.S. Army Superintendent, Virginia Military Institute

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VSSEF 2013 Sponsors

ACKNOWLEDGEMENTS

John R. Broderick, President, Old Dominion University

Carol Simpson, Provost and Vice President for Academic Affairs, Old Dominion University

Oktay Baysal, Dean, Frank Batten College of Engineering and Technology, Old Dominion University

Chris D. Platsoucas, Dean, College of Sciences, Old Dominion University

Office of Admissions, Old Dominion University

Office of Publications, Old Dominion University

Office of University Events, Old Dominion University

Management and Staff of Ted Constant Convocation Center, Old Dominion University

Management and Staff of Aramark, Old Dominion University

Faculty and Student Volunteers, Old Dominion University

ROTC and Honors College Students

Special thanks to:

Danny Peters, Christine Lipuma, Greg and Lisa Field, Ajay Gupta and Computer Science students, Gabriel Franke, Dr. Tom DeVore, Dr. Chris Hermann, Martha Vogel, Myra Thayer

SCHEDULE OF EVENTS

FRIDAY, April 5th, 2013

6:00 p.m. – 8:00 p.m. Registration and setup – VMI Cameron Hall

- 1. Students check in at registration desk.
- 2. Students set up exhibits.
- 3. Exhibits must be approved by Display & Safety Committee

SATURDAY, April 6th, 2013

7:00 a.m. – 7:30 a.m. Judges check in.

8:00 a.m. – 12:30 p.m. Judges will interview exhibitors for category and special awards.

Only exhibitors and judges will be allowed in the exhibit area during

judging.

11:30 a.m. – 12:30 p.m. Boxed lunches provided for exhibitors.

1:00 p.m. Announcement of Grand Prize nominees

Nominees return to exhibits.

1:00 p.m. – 2:30 p.m. Judges will interview Grand Prize Nominees.

2:30 p.m. – 4:00 p.m. Exhibits will be open to the public.

4:00 p.m. – 5:30 p.m. AWARD CEREMONY IN CAMERON HALL

Finalists must attend the award ceremony to receive their awards!

Exhibits MAY NOT be dismantled during the ceremony.

You must wait until the ceremony concludes to dismantle your projects.

Please see the Fair Coordinator for instructions if you are unable to attend the ceremony.

JUDGES

Category Judges

HEAD JUDGE: MAJ Randall Cone, Ph.D.

Dr. Adele K. Addington

Dr. Ana Aguilera

MAJ Anne Alerding, Ph.D.

John Alerding

Eileen Smith Anderson-Bill, Ed.D.

Dr. Nadia Ayoub

Dr. Phil Bailey

Dr. Supriyo Bandyopadhyay

COL Tom Baur, Ph.D.

Lisa Beckstrom

MAJ Joyce Blandino, Ph.D.

Dr. Arthur Bowman

Dr. Rich Bradley

Dr. Richard Brown

Karen Canody

Dr. Venkatesan Chakrapani

MAJ Dimple Chalishajar, Ph.D.

Dr. Samanta Chhanda

Dr. Lynn Chin

Dr. Katie Croft

Jason Dunavant

Dr. Joy Ferrenbaugh

Dr. Richard D. Gardner

John A. Garman

Dr. Gene Godbold

Alan M. Goldberg

Dr. Calvin C. Hale

Dr. Natasha Harrigan

MAJ Daniel Harrison, Ph.D.

Dr. Heather Harwell

Dr. Fred Hearty

Dr. Jiang Honglin

Gordon Jones

Hans Keithley

Dr. Sungwon Kim

William LaBelle

B.J. Lawrence

Dr. Marlow Lemons

Dr. Jeffrey Lennon

Dr. Arnold Leonard

Dr. Simon D. Levy

Dr. Paul Low

Dr. Ramon A. Mata-Toledo

Kristian Mattarochia

CAPT Bob McMasters, Ph.D.

Ralph McTaggart

Hap Miller

Dr. Katherine ONeill

Doug Penney

Philip Peters

Dr. Stan Ponce

Dr. Monica Ponder

Dr. Satyam Priyadarshy

MAJ E. Lee Rakes, Ph.D.

Dr. Nancy Richardson

CAPT Ned Riester, Ph.D.

Dr. Pat Schirmer

Brig. Gen. Wane Schneiter, Ph.D.

Meggan Schoenberg

Dr. Erin M. Smith

Dr. Timothy Sprano

Dr. Paul Sulewski

Dr. Mohammed Talukder

Dr. Wayne S. Teel

Jeffery Timmerman

Dr. Matthew Tuchler

COL James E. Turner, Ph.D.

Dr. John Vadnal

Dr. Arun K. Verma

Dr. Renuka Verma

Dr. R. Alan Whitehurst

Special Award Judges

Richard Brown

Dr. Bill Burston

Dr. Clay Devening

Dr. Avi Gibberman

Dr. Bill Graver

Ariadne Dane Hernandez

Dr. Wallace L. Huff

Dr. Leonard Jackson

Jeremy Jordan

Khalid Kader

Dr. Leah Luck

Dr. Kirk Norbo

Dr. James Otten

Dr. Jackson Payne

CAPT Richard Rigazio, USN (Ret.)

Dr. James Roth

Dr. Tim Russell

Lyubov Slashcheva

Dr. Matt Storm

Dr. Richard Zechini

SPECIAL AWARD DESCRIPTIONS

American Meteorological Society

Awards 2 certificates of Outstanding Achievement to student exhibitors for the two best meteorological projects.

American Psychological Association

Awards a certificate for outstanding research in psychology in the category of Behavior & Social Science.

ASM Materials Education Foundation

Awards a certificate and medallion to the best materials engineering project.

Association for Women Geoscientists

Awards a certificate to a female student whose project, in the opinion of the judges, exemplify high standards of innovativeness and scientific excellence in the geosciences. Special consideration should be given to projects that increase the public awareness of the geosciences, illustrate the interdisciplinary nature of the geosciences or promote the sensitivity to the earth as a global system.

Intel Excellence in Computer Science

Awards a certificate and \$200 to the top first place winner of the Computer Science category in the senior division.

Mu Alpha Theta

Is the National High School and Two-Year College Mathematics Honor Society. awards a certificate to the individual or team project, demonstrating the most challenging, original, thorough, and creative investigation of a problem involving modern mathematics. This project does not necessarily have to be entered in the mathematics category.

National Oceanic and Atmospheric Administration (NOAA)

Awards a certificate and medallion to the project selected from among all the general award categories whose research emphasizes NOAA's mission to understand and predict changes in Earth's environment and conserve and manage coastal and marine resources to meet our Nation's economic, social, and environmental needs.

National Society for Professional Engineers

Awards a certificate and a lapel pin to the most outstanding engineering project demonstrating technical competence, superior verbal and written presentation of the project, professional appearance and demeanor, and preferred awareness of ethical implications of engineering.

The Regional Ricoh Sustainable Development Award

Awards a certificate to one individual or team, selected from among all the general award categories, whose principles and technical innovations offer the greatest potential for increasing our ability to grow environmentally friendly and socially responsible businesses.

Society of In Vitro Biology

Awards a certificate to a high school junior in the category of plant or animal in vitro biology or tissue culture.

U.S. Air Force

Encourages studies in the math and science areas and to look for projects that could possibly have some Air Force applicability; 4 awards of a certificate, a laptop backpack, personal lunch bag, helicopter pen, and a 3-in-1 calculator/frame/clock.

U.S. Army

Awards projects in Engineering, Environmental Science/Earth Science for grades 9-12 in Mathematics/Computer Science, Physical Sciences, and the Life Sciences. Of these 5, the best project will receive a certificate of achievement and a presentation folder. 4 of the 5 will reach receive \$50 U.S. Savings Bond. The remaining Category winner, who is considered most outstanding will receive a \$100 U.S. Savings Bond and the Army's "Army's Silver Medallion for Science/Engineering Excellence."

U.S. Department of Health and Human Services

Awards a certificate to a winning project that creatively illustrates and expands upon the following statements from the Surgeon General: regular physical activity is important for maintaining good health, a healthy diet is key to maintaining a healthy weight and having a long healthy life, tobacco use is hazardous to your health, injury and illness prevention saves lives.

U.S. Metric Association

Awards a certificate to the student whose project involves a significant amount of quantitative measurement and which best uses the SI metric system for those measurements.

U.S. Navy/Marine Corps - Office of Naval Research

The Office of Naval Research plans, executes, coordinates and promotes science and technology for the US Navy and Marine Corps through work performed at universities, naval laboratories and industrial research centers. Awards 5 projects a certificate of achievement, a medallion, and a \$50 gift certificate.

Virginia Dental Association: Science Talent Awards Program

Promotes dentistry through the encouragement of experimental exploration of research; awards Certificates of Merit, career information, (20) \$100 awards and one Grand Award of \$1500.

Virginia Tech Statistics Award

Is awarded by the Undergraduate Statistics Club at Virginia Tech. Three cash prizes (\$100, \$50 and \$25) and two honorable mentions are awarded. Any project from the life sciences is eligible. The awards are given for the best use of statistical analysis and experimental design and the ability to effectively explain all statistics used in the project.

Yale Science & Engineering Association

Awards a certificate and medallion to the most outstanding 11th grade student exhibiting in the areas of Computer Science, Engineering, Physics or Chemistry.

Awards Ceremony

(4:00-6:00pm)

Opening Remarks

Carol Simpson Provost, Old Dominion University

Special Awards	Presenter
American Meteorological Society	VSSEF
American Psychologists Association	VSSEF
American Water Works Association	VSSEF
ASM International Foundation	VSSEF
Association for Women Geoscientists	VSSEF
Intel Excellence in Computer Science	VSSEF
Mu Alpha Theta	VSSEF
National Oceanic & Atmospheric Administration (NOAA)	VSSEF
"Taking the Pulse of the Planet" Award	
National Society of Professional Engineers	VSSEF
Regional Ricoh Corporation Sustainable Development Award	VSSEF
Science Applications International Corporation (SAIC)	Dr William Graver
Awards in Physics, Computational and Applied Sciences, Microbiology	
Society for In Vitro Biology	VSSEF
Stockholm Jr. Water Prize	VSSEF
U. S. Air Force	VSSEF
U.S. Army	VSSEF
U.S. Department of Health and Human Services Award	VSSEF
U.S. Metric Association Award	VSSEF
U.S. Navy/Marine Corps Award,	Captain Rick Rigazio (Ret)
Office of Naval Research	
VABio	VSSEF
Virginia Dental Association: Science Talent Awards Program	Dr. Timothy E. Russell, Dr. Kirk Norbo
	Dr. Jackson Payne
Yale Science and Engineering Award	VSSEF

Category Awards

Animal Sciences

Behavioral and Social Sciences

Biochemistry

Cellular & Molecular

Chemistry

Computer Science

Earth & Planetary Science

Engineering: Electrical & Mechanical

Engineering: Materials and Bioengineering

Energy & Transportation

Environmental Management

Environmental Sciences

Mathematical Sciences

Medicine and Health Sciences

Microbiology

Physics and Astronomy

Plant Sciences

Virginia State Science Fair Grand Prize Awards

Governor's Award and Grand Prize Virginia Secretary of

Technology Jim Duffey

Second Grand Prize Brigadier General Wane Schneiter

Third Grand Prize Brigadier General Wane Schneiter

Student Participants and Projects

Animal Sciences

AS101 Mary Smith Booth #106

Dairy Cattle Breed Effect on Yogurt Quality
Southwest Virginia Governor's School, Pulaski

AS102 John Harbour Booth #102
Drawing Circles Around Ants
Seton High School, Manassas

AS103 Lindsay Stephens Booth #103

Effects of various stimulants and depressants on the regeneration of Dugesia dorotocephala Central Virginia Governor's School, Lynchburg

AS104 Treasure Kennedy Booth #104

Icky Mouse
Richlands High School, Richlands

AS105 Audrey Francis Booth #105
Investigating the Effect of Biochanin A on Ivermectin
Resistance in C. elegans
Academy of Science, Sterling

AS106 Emily Rogers Booth #101
Something Fishy: Caffeine Eggsposure
Thomas Jefferson High School for Science and Technology,
Vienna

AS106 Eduard Danalache Booth #101
Something Fishy: Caffeine Eggsposure
Thomas Jefferson High School for Science and Technology,
Alexandria

AS106 Hanna Carolina Hatanpaa Booth #101
Something Fishy: Caffeine Eggsposure
Thomas Jefferson High School for Science and Technology,
Alexandria

AS107 George Maurakis Booth #107
Testing the Cephalic Adhesive Organ Hypothesis in
Cyprinid Protolarvae
Mathematics and Science High School at Clover Hill, Midlothian

AS108 Will Ferrer Booth #108

The Effect of Aspartame on Planarian Regeneration
George C Marshall High School, Falls Church

AS108 Annika Dirkse Booth #108
The Effect of Aspartame on Planarian Regeneration
George C. Marshall High School, Falls Church

AS109 Christina Lee Booth #109
The Effect of DHA on Pesticide Induced Hyperactivity in Planaria
Sherando High School, Stephens City

AS110 David Lewis Booth #110

The Effect of Hydrogen-Ion Concentration on Eastern
Oyster Filtration Rate
Tabb High School, Yorktown

AS111 Isaac Frank Booth #111
The Effect of Prolonged Exposure to Flavonoids on the Learning Capabilities of Dugesia tigrina
Roanoke Valley Governors School, Roanoke

AS112 Mohini Singh Booth #112
The Effect of Wolbachia on the Apis mellifera Population
Briarwoods High School, Ashburn

AS113 Sarah Tucker Booth #113

The effects of estrogen replacement medication on the vulva development of Caenorhabditis elegans
Central Virginia Governor's School, Lynchburg

A\$114 Daniel Neale Booth #114

The Effects of Protein Skimmers on Saltwater Aquaria
Charlottesville High School, Charlottesville

AS115 Margaret Doyle Booth #115
The Efficacy of the Ipomoea batatas Plant as an Aedes albopictus Larvicide
Yorktown High School, Arlington

Behavioral and Social Sciences

BS101 Saroja Erabelli Booth #119
Autism: Comparing Effects of Auditory Stimuli
Thomas Jefferson High School for Science and Technology,
Alexandria

BS101 Na He Jeon Booth #119
Autism: Comparing Effects of Auditory Stimuli
Langley High School, McLean

BS102 Daniel Abraham Booth #219
Brain Connectivity in Spontaneous Story Telling
Thomas Jefferson HS for Science and Technology, Alexandria

BS103 Madalyn Baldwin Booth #211

Determining diifferences in suggestibility among age groups of children
Central Virginia Governor's School, Lynchburg

BS104 Sarah Quettawala Booth #209

Does Stress Effect the Genome of Danio rerio?

Thomas Jefferson High School for Science and Technology,

Alexandria

BS105 James Rigassio Booth #218

Homo Economicus, Human Altruism, and Behavioral
Game Theory
Washington-Lee High School, Arlington

BS106 Anna Makarova Booth #217

How Breathing Affects Singing
Southwest Virginia Governor's School, Pulaski

BS107 Mary Olohan Booth #216
Know Your Own Mind
Chelsea Academy, Front Royal

BS108 Ana Daley Booth #215
Lie to Us: The Effectiveness & Improvement of a Polygraph
Machine

Albemarle High School, Charlottesville

BS109 Sandra Edwards-Thro Booth #214
Sound It Out: Phonemic vs. Morphemic Processing of
Words
York High, Yorktown

BS110 Emma Beall Booth #213
Teen Pregnancy Prevention

T.C. Williams High School, Alexandria

J.R Tucker High School, Henrico

BS111 Brandon Hiner Booth #212
The Effect of Age on the Perception of the Golden Ratio
Godwin High School, Richmond

BS112 Lakshmi Bodapati Booth #120
The Effect of Gender and Birth Order on the 5 Big
Personality Traits

BS113 Yafeng (Steven) Tian Booth #210
The Effect of Mental Shock on Memory
Battlefield High School, Haymarket

BS114 Mark Tenzer Booth #220
The Effect of Musical Experience on Memory
Roanoke Valley Governor's School, Roanoke

BS115 Carter Gottschalk Booth #208
The effect of prior music experience on the ability to learn to speak a tonal language
Roanoke Valley Governors School, Goodview

BS116 Connor Scro Booth #207

The Effect of Two Different Peripheral Vision Exercises on Peripheral Vision

Roanoke Valley Governor's School, Roanoke

BS117 Rose Paz Booth #206
The Role of Visual Illusion on the Prevention of Falls
Dominion High School, Sterling

Biochemistry

BI101 Jennifer Du Booth #202

3D Reconstructions of Photoreceptor Mitochondria

Thomas Jefferson High School for Science and Technology,
Ashburn

BI102 Arya Dahal Booth #303

Can EGCG in Green Tea Target HSP70 Breast Cancer?

Thomas Jefferson High School for Science and Technology,
Alexandria

BI102 Thrisha Potluri Booth #30

Can EGCG in Green Tea Target HSP70 Breast Cancer?

Thomas Jefferson High School for Science and Technology,
Alexandria

BI103 Vaibhav Tadepalli Booth #304
Can We Use Snails to Repair Ligaments?
Loudoun County Academy of Science, Purcellville

BI104 Chandler King Booth #302

Hair Pigmentation: The Link Between Cats, Cancer, and Spiny Mice
Governor's School @ Innovation Park, Manassas

BI104 Zachary Chapman Booth #302
Hair Pigmentation: The Link Between Cats, Cancer, and
Spiny Mice
Governor's School at Innovation Park, Manassas

BI105 Daniel Tavakol Booth #201
Identification of Human Metabolomic Biomarkers
James Madison High School, Vienna

BI106 Andrea Li Booth #301

IFN in Breast Cancer & Leukemia Cell Proliferation

Thomas Jefferson High School for Science and Technology,

Alexandria

BI107 Madison Nguyen Booth #305
Marine Bioactive Substances and S. mediterranea
Paul VI High School, Fairfax

BI108 Haley Gibbs Booth #306
Stability of Epigallocatechin-gallate in Green Tea:
Protective Effects of Ascorbic Acid
Sherando High School, Stephens City

BI109 Sayantanee Das Booth #307
Time Dependency of the Effect of INN-270 on the Oxygen
Affinity of Hemoglobin
Mills E Godwin High School, Richmond

Cellular and Molecular Biology

CM101 Reece Echelberger Booth #311
Gene Therapy to Attract Cells to Blood Vessels for Heart
Attack Prevention
Albemarle High School, Charlottesville

CM102 Manotri Chaubal Booth #312
Reprogramming Dental Pulp Stem Cells into Hepatocy
Thomas Jefferson High School for Science and Technology,
Alexandria

CM103 Emily Knopf Booth #313

The Effect of Antagomirs on Apoptosis in Pancreatic Cancer Cells

Roanoke Valley Governor's School, Roanoke

CM103 Benjamin Greenawald Booth #313
The Effect of Antagomirs on Apoptosis in Pancreatic
Cancer Cells
Patrick Henry High School, Roanoke

CM104 Blake Nowakowski Booth #314

The effect of chlorine gas on the metabolism of Saccharomyces cerevisiae Central Virginia Governors School, Lynchburg

CM105 Aolin Zhang Booth #315
The Effect of Statins (HMG-CoA Reductase Inhibitors) on
Ca2+ Release from the NAADP-sensitive Ca2+ Channel of
Macrophage Lysosomes
John Randolph Tucker High School, Richmond

Chemistry

CH101 Jasmine Jellá Booth #319

A Golden Opportunity to Go Green
Loudoun Academy of Science, Sterling

CH102 Arjun Jaini Booth #320
A Quantum Mechanical Study of Tautomeric Triggers of Bergman Cyclization
Hanover High School, Mechanicsville

CH103 Tiffany Wang
Caffeine Levels in Different Types of Tea
Mills E Godwin High School, Henrico

Booth #420

CH104 Joseph Pauli **Booth #419** Calorie Content in Public School Food vs. Fast Food Southwest Virginia Governor's School, Pulaski **CH105** Jennie Kim **Booth #418** Chemiluminescent Aptasensor Using Nanotubes Thomas Jefferson High School for Science and Technology, Alexandria CH105 Julie Kim **Booth #418** Chemiluminescent Aptasensor Using Nanotubes Thomas Jefferson High School for Science and Technology, Alexandria CH106 **Kirsten Cardinal** Booth #417 Determining Antioxidative Strength with Lightstick Thomas Jefferson High School for Science and Technology, Alexandria CH106 **Booth #417 Caroline Kerr** Determining Antioxidative Strength with Lightstick Thomas Jefferson High School for Science and Technology, Alexandria CH107 Sarah Valencia **Booth #416** Effect of Group # on Enthalpy Change of Reaction Mount Vernon High School, Alexandria Kavita Priyadarshy **Booth #415** Effect of LED Color on Radiation by Quantum Dots Chantilly High School, Chantilly CH109 Ari Ghasemian **Booth #414** Effect of pH on the Strength of Gelatin Solution McLean High School, McLean **CH110** Booth #413 Anurag Kanapuram Effect of Position of a Mn Atom on One Si Layer Chantilly High School, fairfax **Taylor Duncan Booth #412 CH111** Effects of Autoclaving on Suture Material Southwest Virginia Governor's School, Pulaski Mattie Leibowitz Booth #411 **CH112** Heat Release from Sodium Acetate Heat Packs West Potomac High School, Alexandria Sadie Crouch **Booth #410** Higher Amounts of Lead are Released in Acidic Solvents Sherando, Stephens City CH114 Elissa Carpio **Booth #409** The Ability of Chiral Molecules in Glucose to Rotate Polarized Light Tabb High School, Yorktown **CH115** Jeremy Nussbaum Booth #408 The Dangers of Aspartame: An Investigation of Temperature and the Production of Methanol Yorktown High School, Arlington Shanmuka Gadiraju **Booth #407** The Effect of Metal Catalysts on Oxidation W.T. Woodson High School, Fairfax CH116 Sam Garretson **Booth #407** The Effect of Metal Catalysts on Oxidation WT Woodson High School, Fairfax

CH116

Sirin Perez

W.T. Woodson High School, Fairfax

The Effect of Metal Catalysts on Oxidation

CH117 Mahathi Kambham Booth #406
The Effect of Turmeric on the Shelf-Life of Milk
Chantilly HS, Chantilly

CH118 Kelley Mark Booth #405
The Synthesis of Ribose and Meteoric Amino Acids in a Prebiotic Environment
Yorktown High School, Arlington

CH119 Maralee Bell Booth #404
Unlocking the Secret of the Universal Solvent
Osbourn High School, Manassas

Computer Science

CS101 Lauren Huang Booth #501

A Noval Mutation Operator for Genetic Algorithms
Thomas Jefferson High School for Science and Technology,
Alexandria

CS101 Avinash Ramesh Booth #501
A Noval Mutation Operator for Genetic Algorithms
Thomas Jefferson High School for Science and Technology,
Alexandria

CS102 Selena Feng Booth #510
A Novel Solution to the Traveling Salesman Problem
Albemarle High School, Charlottesville

CS103 Kevin Kabaria Booth #508
Computer Vision: Creating an Adaptable Environment
Based Recognition System
Richlands High School, RICHLANDS

C\$104 Jared Nielsen Booth #504
Creating an Artificial Intelligence Othello Player
Herndon High School, Herndon

CS105 Andrew Luo Booth #502

Designing Algorithms to Conrol Autonomous Vehicles
Governor's School for Science and Technology, Hampton

CS106 Andrew Subowo Booth #503

Development of Cross-Platform Software Architecture for Meteor Detection and Camera Calibration

Dominion High School, Sterling

C\$107 David Pearson Booth #505

Harnessing the Processing Power of Mobile Devices

Herndon High School, Herndon

CS108 Peter Marr Booth #509
Image Recall in a Hopfield Neural Network
George C. Marshall High School, Falls Church

C\$108 Matt Epstein Booth #509
Image Recall in a Hopfield Neural Network
George C Marshall High School, Falls Church

C\$109 Adam Ruffa Booth #511
Optimizing 8-Bit Devices with Confounding Code
Langley High School, McLean

CS110 Michael Bibeau Booth #506

Post-Process Operations for Triangle-Based Pixels
Governor's School for Science and Technology (GSST),
Hampton

C\$111 Nathaniel Sutherland Booth #507
Virtual House Roamer Simulation
Osbourn High School, Manassas

Booth #407

Earth and Planetary Science

EP101 Katherine Webb Booth #515 A Revised Estimate of the Effect of Human Carbon

Dioxide (CO2) Emissions on Global Temperature Tabb High School, Yorktown

> **Booth #516** Alec Brenner

Arctic Paleoclimate Reconstruction from Microfauna Thomas Jefferson High School for Science and Technology, Alexandria

EP103 Nipun Singh Booth #520

Computational Journey to the Center of the Earth Thomas Jefferson High School for Science and Technology,

EP103 Nathan Kodama Booth #520

Computational Journey to the Center of the Earth Thomas Jefferson High School for Science and Technology, Alexandria

EP104 Meredith Hooper Booth #518

Correlative Studies of Solar Flux, Geomagnetic Indices, and Van Allen Radiation Belt Structure Albemarle High School, Charlottesville

EP105 Megan Fischer Booth #519

Determination of Sources Areas for Clasts within the Leesburg Member of the Ball's Bluff Formation Loudoun County High School, Leesburg

Yekaterina Gilbo **Booth #517 EP106**

Effect of Solar Activity on Earth?s Magnetic Field George C. Marshall High School, Falls Church

EP107 Christopher Gerlach Booth #620

Predicting Severe Wind Gust Events in the Baltimore-Washington Forecast Area Using the WSR-88D Doppler Radar TC Williams High School, Alexandria

EP108 Ashley Snead Booth #619

The Effect of Water Pressure on Moraine Stability and Sensing of Pressure Sensor Lee-Davis High School, Mechnicsville

EP109

Max Luo **Booth #618**

Using Satellite Imagery to Locate Algal Blooms Langley High School, McLean

EP109 Andrew Ton Booth #618

Using Satellite Imagery to Locate Algal Blooms Langley High School, Mclean

Energy and Transportation

Booth #614 ET101 Christopher Clarke

Can We Make a Safer Airfoil? Lake Braddock Secondary School, Burke

Booth #613 Ryan Devens Design of a High-Endurance Payload Capable

Composite Blended Wing Unmanned Aerial Vehicle Roanoke Valley Governor's School, Roanoke

ET102 James Stewart **Booth #613**

Design of a High-Endurance Payload Capable Composite Blended Wing Unmanned Aerial Vehicle Roanoke Valley Governor's School, Roanoke

ET103 **Eric Chang** **Booth #612**

Booth #611

Designing, Prototyping, and Testing Agricultural Drones Christiansburg High School, Christiansburg

ET103 Booth #612 Jordan Kuhn

Designing, Prototyping, and Testing Agricultural Drones Christiansburg High School, Christiansburg

Manolya El-Sekkaki ET104

Effect of Varying Solar Cell Type on Voltage Langley High School, McLean

ET105 **Tanner Hav** Booth #610

Improving UPS Delivery Truck Drag Using Pre-existing **Devices**

Southwest Virginia Governors School, Pulaski

Paul Girais ET106 **Booth #609**

Proprietary Wind Energy System Amplifies Electricity Generation while Consolidating Storage

Science, Mathematics & Technology Center at Mills E. Godwin High School, Henrico

ET107 John Apperson **Booth #608** Pulse Jet Design and Thrust

West Potomac HS. Alexandria

ET107 Jeremy Basdeo Booth #608

Pulse Jet Design and Thrust West Potomac High School, Alexandria

ET107 **Alan Worth Booth #608**

Pulse Jet Design and Thrust West Potomac High School, Alexandria

ET108 Booth #607 **Grant Ours**

Rotor Shape and Wind Turbine Output West Potomac High School, Alexandria

Gillian Horn **Booth #606**

The Effect of Biomass Source on Biogas Production Roanoke Valley Governor's School, Roanoke

Linda Alexander Booth #605

The Effect of Filtered Byproducts on the Stability of a Flame

York High School, Yorktown

Jill Ferguson **Booth #601**

The effect of graphene based electrodes in organic photovoltaic cells

Roanoke Valley Governor's School for Science and Technology, Roanoke

ET111 **Eryn Campbell Booth #601**

The effect of graphene based electrodes in organic photovoltaic cells

Staunton River High School, Goodview

Patrick Silsby Booth #603

The Effect of Morphing Wing on Lift and Drag

Chantilly High School, Chantilly

ET113 Michael Bollman Booth #602 The Effect of Water Salinity on Electrolysis

Centreville HS, Clifton

Sanjana Kurup ET114 **Booth #604**

Varying Phosphorus Concentrations and Extraction Procedures in Lipid Quantification of Scenedesmus auadricauda

Loudoun Academy of Science, Sterling

Engineering: Electrical and Mechanical

ENG-E101 Andres Artze Ablation Resistance: Performance of Metals James W. Robinson Jr. Secondary School, Fairfax	Booth #706
ENG-E101 Michael Sherburne Ablation Resistance: Performance of Metals Robinson Secondary School, Fairfax	Booth #706
ENG-E102 Samuel Rohrer Design of a Near-Field Beamforming System Thomas Jefferson High School for Science and Te Alexandria	Booth #702 echnology,
ENG-E103 Rena Yuan Effect of Sea Snake Segments on Electrical C James Madison High School, Vienna	Booth #707 Output
ENG-E103 Soraya Tarrah Effect of Sea Snake Segments on Electrical C James Madison High School, Vienna	Booth #707 Output
ENG-E104 John Hawley Exploration in Engineering Multitouch Yorktown High School, Arlington	Booth #701
ENG-E105 Henry Love High Frequency Resonant Transformer Yorktown High School, Arlington	Booth #703
ENG-E105 Julian Thomassie High Frequency Resonant Transformer Yorktown High School, Arlington	Booth #703
ENG-E106 ShiJia Wang Investigation of Vertical Vibration Isolation do Turbulence York High School, Yorktown	Booth #708 uring
ENG-E107 Kelly Devens Maximizing Electrical Power Output of a Hori. Wind Turbine Generator Roanoke Valley Governor's School, Roanoke	Booth #709 zontal-Axis
ENG-E108 Aleco Reynolds Super-Resolved Iris Recognition Governor's School @ Innovation Park, Manassas	Booth #710
ENG-E109 Richard Middaugh The effect of different variations of an impellovertical axis wind turbine on its efficiency Central Virginia Governor's School, Lynchburg	Booth #711 er type
ENG-E110 Justin Aird Using a Capacitor as a Lighting Rod to Deflet a Place of Absorption as an Alternative Energy Academy of Science, Sterling	
ENG-E111 James Lyons Vibrational Characteristics of a Bassoon Ree Governor's School for Science & Technology, Har	
ENG-E112 Malcolm McRae W. A. S. P.: Wegnens Alert Sensor Program	Booth #705

W. A. S. P.: Weapons Alert Sensor Program

Brooke Point High School, Stafford

Engineering: Materials and Bioengineering

ENG-M101 Siddharth Balakrishnan Booth #716

A Biodegradable Polymer for Retinal Cell Growth
Chantilly High Schhol, Chantilly

ENG-M102 Adriel Sumathipala Booth #717

Biofuel Cells Made with Nanoparticles and Enzymes for
Bioimplants and Biosensors
Broad Run High School, ASHBURN

ENG-M103 Jayanth Devanathan Booth #718
Digit Detection Using Muscle Ultrasound Imaging
Thomas Jefferson High School for Science and Technology,
Alexandria

ENG-M104 Lani Allen

Durability and Effectiveness of Mask Materials

George C. Marshall, Falls Church

ENG-M104 Ashley Anderson Booth #719

Durability and Effectiveness of Mask Materials

George C. Marshall High School, Falls Church

ENG-M105 Catherine Park

Effects of Insulation on Temperature Change
Langley High School, Great Falls

Booth #817

ENG-M106 Garrett Nekic Booth #811

Exploring Antifouling Properties of Zinc Oxide

Nanoparticles in an Electrospun Nylon Membrane

Loudoun Academy of Science, Sterling

ENG-M106 Conor Keevey Booth #811

Exploring Antifouling Properties of Zinc Oxide

Nanoparticles in an Electrospun Nylon Membrane

Loudoun Academy of Science, Sterling

ENG-M107 Jacqueline Kolhof Booth #819
Materials? Ability to Insulate Against Temperature
South Lakes High School, Reston

ENG-M108 Yash Singh

Nanoparticle Extraction of Hepcidin to Treat MRSA

Chantilly High School, Chantilly

ENG-M109 Radha Venkatesan Booth #720
Surface-Enhanced Raman Scattering of Quinine-linked
Gold Nanoparticles
New Horizons Governor's School for Science & Technology,
Hampton

ENG-M110 Mack McCune
Tempered Steel Strength
McLean High School, McLean

ENG-M111 Ana Cedillo Booth #815

The effect of a dimpled surface on the lift and drag of model plane wings

Central Virginia Governor's School, Lynchburg

ENG-M112 Alon Bendelac Booth #814

The Effect of Parachute Design on Descent Rate
Chantilly High School, Chantilly

ENG-M113 Lindsey Vanderlyn Booth #813
The Effect of Solvent on the Mechanical Strenth of
Electrospun Natural Biopolymer Meshes Containing Salts
Briar Woods High School, Ashburn

ENG-M114 Jon Gustafson **Booth #812**

The Effect of the Partial Substitutuion of Cement with a Recycled Pozzalan on Concrete Compression Strenath Sherando High School, Stephens City

ENG-M115 Xiaoran Zhu **Booth #820**

uBreathe: The Development of a Portable Nasal Spirometer

Western Albemarle High School, Crozet

Environmental Management

EM101 **Booth #807 Alice Wang** Effect of Substances on Oil Neutralization

Chantilly High School, Chantilly

EM102 Tristan Keightley Booth #801 Effects of Stream Water Quality on Potomac & Bay

West Potomac High School, Alexandria

Booth #801 Cyrus Adams-Mardi

Effects of Stream Water Quality on Potomac & Bay West Potomac High School, Alexandria

EM103 Valentina Lohr **Booth #805**

Greywater Filtration To Protect Worm Flood Supply Thomas Jefferson High School for Science and Technology, Alexandria

EM104 **Zachary Roman** Booth #901

Growth of Spongillidae Gemmules in Stream Water Langley High School, McLean

EM105 Kara Newman **Booth #803**

Heavy Metal Filtration and Flocculation using Natural **Materials**

Loudoun County Academy of Science, Sterling

Booth #802 EM106 **Kevin Anderson**

Liming Effect in Different Types of Soil South County High School, Lorton

EM106 **Puneet Badwal** Booth #802

Liming Effect in Different Types of Soil South County High School, Lorton

EM107 **Charles Lee Booth #806**

Measurements of Growth of Juncus effusus Lake Braddock Secondary, Burke

EM108 Jean Jeon **Booth #804** The Effect of Different Repressions on Waves

Herndon High School, Herndon

Booth #804 Abigail Gershman EM108

The Effect of Different Repressions on Waves Herndon High School, Herndon

EM109 Booth #902 Jack Lohmann

The Effect of Free-Floating Aquatic Macrophytes on the Denitrification of Marine Environments

Douglas Southall Freeman High School, Henrico

EM110 Rachel Coughlin Booth #903

The Effect of Redistributed Food Items on the Amount of Lunch Waste in Schools

Loudoun County High School, LEESBURG

EM111 **Rohan Mathew** Booth #904

The Effect of Water Hyacinth (Eichhornia crassipes) on the Bio-absorption of Different Heavy Metals

Mills E. Godwin High School, Richmond

Rose Yim

Booth #905

The Effect of Water Soluble Plastic on Bean Plants South County High School, Fairfax Station

Elaine Kim

Booth #905

The Effect of Water Soluble Plastic on Bean Plants South County High School, Lorton

EM113 Kai DeBus **Booth #906**

The Effects of Phyto and Bioremediation on Oil Spills Lake Braddock Secondary School, Burke

EM114 Elizabeth Rintels **Booth #907**

The Water Watcher: Product Development and Life Cycle **Analysis**

Albemarle High School, Charlottesville

EM115 Krysta Luzynski Booth #908

Trash to Tresure: Using Discarded Seashells to Filter Heavy

Metal Contaminated Water

Roanoke Valley Governor's School, Roanoke

Environmental Sciences

ES101 Morgan Carter

A Study of Water Quality in the Potomac River Watershed Strasburg High School, Strasburg

Monique McGough

Booth #912

Booth #912

A Study of Water Quality in the Potomac River Watershed Strasburg High School, Strasburg

Mitchell Gillin Booth #913

Algae: A Blooming Fuel Source

The Governor's School @ Innovation Park. Havmarket

Madeleine Guyant

Booth #913

Algae: A Blooming Fuel Source

The Governor's School at Innovation Park, Manassas

ES103 Jeff Feng Booth #914

Alkylphenols in Liquid Laundry Detergents Southwest Virginia Governor's School, Pulaski

ES104 Katie Pearson

Comparing Different Purification Methods

Booth #915

Booth #915

Robinson Secondary School, Fairfax

Yoojin Lee Comparing Different Purification Methods

Robinson Secondary School, Fairfax

ES104 Reagan Redman

Booth #915

Comparing Different Purification Methods

Robinson Secondary School, Fairfax

Booth #916

ES105 Kaitlyn Hudenbura Dendrochronology: Historic Climatology in N. VA South Lakes High School, Reston

ES105 Emma Cahoon Booth #916

Dendrochronology: Historic Climatology in N. VA South Lakes High School, Reston

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Dendrochronology: Historic Climatology in N. VA
South Lakes High School, Reston

ES106 Hailey Arindaeng Booth #917

Effect of Buffers on Reducing the Acidity of Rain
James Madison High School, Vienna

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Effect of Buffers on Reducing the Acidity of Rain
James Madison High School, Vienna

ES107 Jessica Smith Booth #918
Increasing f/2 on Growth of Prorocentrum minimum
Langley High School, McLean

Keep it Clean: The Effect of Pollutants on Neonate
Daphnia Magna
Classical Conversations, King George

ES109 Andrew Reese Booth #920

Measuring the Survivability of Brazilian Watermilfoil After
Desiccation and Rehydration
T. C. Williams High School, Alexandria

ES110 Callista Skaggs Booth #1020
Plastic Material Found in Sand Samples
Mount Vernon High School, Alexandria

ES111 Ariel Bobbett Booth #1019
Salt Marshes are Net Sinks of Greenhouse Gases
Washington-Lee High School, Arlington

Testing for the Bioaccumulation of Strontium 90 in the Mollusks of Lake Anna

Potomac Falls High School/Loudoup Academy of Science

Potomac Falls High School/Loudoun Academy of Science, Potomac Falls

ES113 Jason Wilkinson Booth #

S113 Jason Wilkinson Booth #1017
The effect of design element modifications on bio-sand filter efficiency
Roanoke Valley Governor's School, SW, Roanoke

ES114 John-Reid Ryan Booth #1016
The Effect of Different Pollutant Salts and Salt
Concentrations on Rotifer Death
Hanover High School, Mechanicsville

E\$115 Anna Michels Booth #1015
The Effect of Disposed Materials on Water Quality
Chantilly HIgh School, Chantilly

ES115 Kayla Blatman Booth #1015
The Effect of Disposed Materials on Water Quality
Chantilly High School, Chantilly

ES116 Claudia Atwood Booth #1014
The Effect of Fertilizers on Soil Quality
James Madison High School, Vienna

ES117 Emma Dodd Booth #1013
The Effect of Salt vs. Alum on Water Turbidity
Herndon High School, Herndon

ES118 Sarah Lewis Booth #1012

The Effect of the Type of Pipe on Effectiveness of a Desalination Solar Trough Tabb High School, Yorktown

ES119 Demetrios Maurakis Booth #1011
The Effects of Acetylsalicylic Acid on Survivability of

Aquatic Insects

Midleshier Uigh Midleshier

Midlothian High, Midlothian

ES120 Maria Kanevsky Booth #1010
Wolbachia Presence in Aquatic Macroinvertebrates
Thomas Jefferson High School for Science and Technology,
Alexandria

ES120 Kinsey Moser Booth #1010
Wolbachia Presence in Aquatic Macroinvertebrates
Thomas Jefferson High School for Science and Technology,
Alexandria

Mathematical Sciences

MS101 Simanta Gautam Booth #1006
A Novel Approach to the Spherical Codes Problem
Albemarle High School, Charlottesville

MS102 Christopher Teeple Booth #1005

Modeling the Distribution of Compressed Air at the Radford Arsenal Franklin County High School, Rocky Mount

M\$102 Allie Shepherd Booth #1005

Modeling the Distribution of Compressed Air at the Radford Arsenal Franklin County High School, Rocky Mount

MS103 Jeffrey Zhang Booth #1004

Modeling the Effectiveness of Acetic Acid or Hydrated

Lime as Treatment Methods for Invasive Didemnum

vexillum in Puget Sound

Loudoun Academy of Science, Sterling

M\$104 Harout Boujakjian Booth #1003

Modeling the Volume of Lake Powell
8172 Douglas Fir Drive, lorton

MS105 Rohan Banerjee Booth #1001
On the Stability of Lung Parenchymal Lesions
Thomas Jefferson High School for Science and Technology,
Alexandria

MS105 Archis Bhandarkar Booth #1001

On the Stability of Lung Parenchymal Lesions
Thomas Jefferson High School for Science and Technology,
Alexandria

M\$106 Ziqi Zheng Booth #1002

Power 10: A New Scoring System for Bowling
Blacksburg High School, Blacksburg

W\$107 Brandon Whitfield Booth #1101
Statistical Study of Financial Indicators and their Optimal
Forecast Horizon of GDP
Science, Math & Technology Center at Godwin High School,
Richmond

M\$108 Aarti Purohit Booth #1102
Statistically Significant Differences in Accuracy Between
Different Types of Integral-Estimating Formulas
Sherando High School, Stephens City

MS109 Kanika-Devi Hav Booth #1103

The Effect of Different Origami Models on the validity of the Kawasaki Theorem and Huzita's Axioms Washington-Lee High School, Arlington

Dakota Wenberg MS110

Booth #1104

The Effect of GDP on the Price of a Bia Mac Washington- Lee High School, Arlington

Medical and Health Sciences

MH101 YuChia Wang Booth #1108

Comparison of the Frequency of the Methylenetetrahydrofolate Reductase (MTHFR) C677T Polymorphism in Bipolar Versus Controlled Subjects Sherando High School, Stephens City

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Determination of Tumor Heterogeneity in Primary Cell Culture From Renal Tumor

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MH102 Jason Zhang Booth #1109

Determination of Tumor Heterogeneity in Primary Cell Culture From Renal Tumor

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MH102 Shreya Raman Booth #1109

Determination of Tumor Heterogeneity in Primary Cell Culture From Renal Tumor

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MH103 **Emma Grecco** Booth #1110

Does Vitamin B6 Alleviate Chemotherapy Effects? The Loudoun County Academy of Science, Sterling

MH104 Thomas Quesenberry Booth #1111

Electrostatic Layer-By-Layer Self-Assembly of Antimicrobial Films

Southwest Virginia Governor's School, Pulaski

MH105 Sachith Gullapalli Booth #1112

Enhancement of Insulin Secretion through Nanoparticle-Mediated Reconstruction of the Lipid Bilayer Roanoke Valley Governor's School, Roanoke

MH106 **Brooke Williams** Booth #1113

Investigation of Antisense Gene Therapy as a Treatment for Osteogenesis Imperfecta

Roanoke Valley Governor's School, Roanoke

MH107 **Ummey Hossain** Booth #1118

Naringin/Limonini: A Bitter Therapy for Cancer Herndon High School, Herndon

Rahil Patel

Booth #1115

Negative Selection of TERT-Deleted Tissue During Epithelial Regeneration Richlands High School, Richlands

MH109 Kaiwen Su Booth #1117

Presence of Microtubule-associated Proteins in the Processing of Mice Oligodendrocytes Godwin High School, Henrico

MH110 Marisa Shotwell Booth #1114

Relationship of Fat & Sugar on Strength of Penicillin Washington-Lee, Arlington

MH111 Zachary Kemp Booth #1120

The Effect of Amyotrophic Lateral Sclerosis Mutations on Sensory Neurons

Roanoke Valley Governor's School, Roanoke

Jacob Johnson

Booth #1119

The Effect of Docohexaenoic Acid on Drosophila melanogaster with Alzheimer's

Roanoke Valley Governor's School, Roanoke

MH112 **Evelyn Strope** Booth #1119

Docohexaenoic The Effect of Acid Drosophila melanogaster with Alzheimer's Roanoke Valley Governor's School for Science and Tech., Roanoke

MH113 Aesha Parikh Booth #1116

The Effects of Different Household Objects on the Efficiency of Relieving Tension Pneumothorax

Tabb High School, Yorktown

Booth #1116

Elizabeth Zhang MH113 The Effects of Different Household Objects on the Efficiency of Relieving Tension Pneumothorax Tabb High School, Yorktown

Microbiology

MI101 **Syed Hossain** Booth #1220

A Novel Way to Detect Cancer Herndon High School, Herndon

Evan Lindsay

Booth #1213

Analyzing growth and development: Effects of iron (III) oxide on endospores

Central Virginia Governor's School, Lynchburg

MI103 Shalini Rana Booth #1219

AntiMicrobial Effect of Brassica juncea on Ecolik1 George C. Marshall High School, Falls Church

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Can folk remedies control E. coli growth? Gloucester High School, Gloucester

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Booth #1215

Comparison of Different Extraction Methods of Oligomeric Proanthocyanidins in Yeast Inhibition Southwest Virginia Governor's School, Pulaski

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Mapping Phosphorylation Sites Necessary for Large T-antigen Stability through PCR-based Mutagenesis H-B Woodlawn Secondary Program, Arlington

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Protist (Paramecium caudatum) Death via Electric Field-Induced Membrane Permeabilization

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Mira Bagous

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Booth #1210

The Effect of Magnetic Fields on the Fermentation of Saccharomyces cerevisiae for Ethanol Production James Wood High School, Winchester

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The Effect of Potency of Ground-up Gryllus assimilis Head

Extracts on E. coli (K-12) Bacteria
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The Effect of the Length of Exposure and Amount of Sertraline Hydrocholoride on the Morphology of Sachromycus Cerrivase Cells Yorktown High School, Arlington

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The Effect of the Length of Exposure and Amount of Sertraline Hydrocholoride on the Morphology of Sachromycus Cerrivase Cells Yorktown High School, Arlington

MI114 Nicholas Shablom Booth #1207
The Effect of Ultraviolet Light on Yeast Growth

Battlefield High School, Haymarket

MI115 Perri Solhjou Booth #1206

The Efficacy of Allium sativum and the Synergistic Combination of hydroxypropanoic acid (C3H6O3) rescens

Stone Bridge High School, Ashburn

Physics and Astronomy

PA101 Chris Chueh Booth #1202

A spectroscopy analysis of molecules in the interstellar medium using Sagittarius B2 as the bright continuum source

E.C. Glass High School, Lynchburg

PA102 Jason Lee Booth #1201

Determining the Decelerations of High-Speed White Thomas Jefferson High School for Science and Technology, Alexandria

PA103 Howoong Park Booth #1301
Effect of Distance Ranging Using Webcams

James Madison High School, Vienna

PA103 Timothy Meng Booth #1301

Effect of Distance Ranging Using Webcams James Madison High School, Vienna

PA104 Matthew Steelberg Booth #1303

Effect of Magnets on Steel Ball Bearings McLean High School, McLean

PA104 Michael Harris Booth #1303

Effect of Magnets on Steel Ball Bearings McLean High School, McLean PA105 Sarthak Sahu Booth #1302

Experimentally Determined Ionization Energies
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Alexandria

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Identifying Radio Frequency Interference
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PA107 Trevor Hittinger Booth #1305
Investigating Energy Production in Wind Turbines

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Physics of the Forward Pass

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PA109 Dean Rye
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Pulsar Research, Discovery, and Their Effect on Scientific
Knowledge and Discovery

PA111 Alexander Nguyen Booth #1309
Radio Astronomy: Radio Frequency Interferences

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PA112 Taylor Zuchowski Booth #1310
Soccer Shin Guard Impact Study
Southwest Virginia Governor's School, Pulaski

PA113 Seungha Lee Booth #1311
Spin on a Baseball Pendulum
Lake Braddock Secondary School, Burke

PA114 Hussain Jaffery Booth #1320
Stalling is not an Option
McLean HS, McLean

PA114 Peter Steele Booth #1320
Stalling is not an Option
Mclean High School, McLean

PA115 Lindsay Kibben Booth #1313
The Effect of Bridge Design on Shape
West Potomac HS, Alexandria

PA116 Grant Gibson Booth #1314
The Effect of Different Football Stances of the Human
Reduces the force Applied to a Training Stad

Body on the force Applied to a Training Sled Governor's School for Science and Technology, Hampton

PA117 Mishu Barua Booth #1315
The Effect of Motor Oil Type on the Coefficient of Friction
Washington-Lee High School, Arlington

PA118 Edward Chung Booth #1316
The Effect of Root Chord Length on Time to Apogee
South Lakes High School, Reston

PA118 Rebecca Jiang Booth #1316
The Effect of Root Chord Length on Time to Apogee
South Lakes High School, Reston

PA119 Brendan Kenefick Booth #1317
The Effect of Soccer Helmets on Impact Force
Oakton High School, Vienna

PA120 **David Dolaher** Booth #1318 The Effect of the Shape of a Spoiler on the Amount of

Down Force Produced

Yorktown High School, Arlington

Christopher Olson PA121 Booth #1319

The effects of tennis vibration dampeners on tennis racket handle vibration

Central Virginia Governor's School / E.C. Glass High School. Lynchburg

PA122 **David Woods** Booth #1312 The Piezoelectric Effect Orange County High School, Orange

PA123 Erinn Fecteau Booth #1420 The Power of Frequency Fairfax High School, Fairfax

PA123 Laura Ji Booth #1420 The Power of Frequency Fairfax High School, Fairfax

Ashleigh Bowan Booth #1419 Ultrasound Visibility of Biopsy Clips Mclean High School, Mclean

PA124 Katherine Pardo Booth #1419 Ultrasound Visibility of Biopsy Clips McLean High School, McLean

PA125 Sourabh Cheedella Booth #1418

Using Kerr-Newman Approximations to Retrodict Subatomic Particle Masses Stone Bridge High School, Ashburn

Plant Sciences

PS101 **Howard Huang** Booth #1415

A Comparison of the Effects of Compost Tea and Synthetic Fertilizer on Turf Grass Roanoke Valley Governor's School, Roanoke

PS101 **Grant Colip** Booth #1415

A Comparison of the Effects of Compost Tea and Synthetic Fertilizer on Turf Grass The Roanoke Valley Governor's School, Roanoke

Carmel Tebyanian Booth #1414 Combined Natural Herbicides and Mung Bean Growth

Robinson Secondary School, Fairfax **PS103** John White Booth #1413

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PS104 **William Thomas** Booth #1412

Functional Foliage: A Study of Dissolved Oxygen Freedom High School, Woodbridge

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PS105 Booth #1411 Matthew Sayen Plants Grow Taller When More Magnets Are Applied to the Soil Sherando High School, Stephens City

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Albemarle High School, Charlottesville

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The Effect of a Directional Change in Gravity on the Growth Rate of Poa pratensis Rootlets Washington-Lee High School, Arlington

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Meredith Young PS111 Booth #1405 The Effect of Induced Ethylene Lever on the Ripening of Unripe Fruit Tabb High School, Yorktown

PS112 Madison Oieda Booth #1404 The Effect of Non-Ionizing Radiation on the Germination and Growth of Phaseolus Vulgaris John Champe High School, Aldie

Booth #1403 **PS113 Sheraz Qamar** The Effect of Sulfuric Acid and Mutation on Plants Hayfield Secondary School, Alexandria

PS113 Luis Rocha Fuentes Booth #1403 The Effect of Sulfuric Acid and Mutation on Plants Hayfield Secondary School, Alexandria

PS114 Brittany Gallahan Booth #1402 The effects of temperatures above 29.5 degrees Celsius on three different Brassica rapa species Central Virginia Governor's School/Rustburg High School, Lynchburg

PS115 Shriya Awasthi Booth #1401 The Phytoremediation and Sequestration of Acetone in Different Parts of Spathiphyllum Plants Academy of Science, Sterling

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