

***REGENERON***

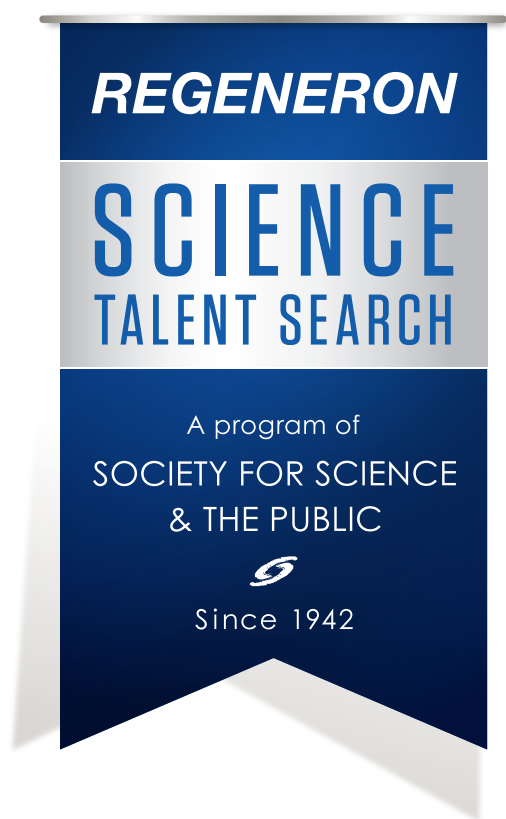
**SCIENCE  
TALENT SEARCH**

A program of  
SOCIETY FOR SCIENCE  
& THE PUBLIC



Since 1942

**REGENERON SCIENCE  
TALENT SEARCH  
2017 SCHOLARS**



# 2017 SCHOLARS

The Regeneron Science Talent Search (Regeneron STS), a program of Society for Science & the Public, is the nation's most prestigious pre-college science competition. Alumni of STS have made extraordinary contributions to science and hold more than 100 of the world's most distinguished science and math honors, including the Nobel Prize and the National Medal of Science. Each year, 300 Regeneron STS scholars and their schools are recognized. From that select pool of scholars, 40 student finalists are invited to Washington, DC in March to participate in final judging, display their work to the public, meet with notable scientists, and compete for awards, including the top award of \$250,000.

## ALABAMA

Birmingham

### Jefferson County International Baccalaureate School

***Sridhar, Varsha R., 18***

Generalization of the Marcus Model for *in vivo* Electron Transfer

## ALASKA

Fairbanks

### West Valley High School

***Chen, David Dawei, 18***

An Analysis of H5-HA Avian Influenza Subtypes in Alaska Migratory Birds

## ARIZONA

Chandler

### Arizona College Preparatory – Erie Campus

***Loop, McKenna Kristin, 17***

Algae Lipid Extraction Methods and Economic Feasibility Analysis –  
Introducing Fungal-Assisted Extraction

### Hamilton High School

***Iyer, Dhruv, 18***

Identifying Pathways Enriched with Differential Dependencies Using LASSO

***Zhu, Justin, 17***

Optimizing Tools for Genomics Data: Enhancing the Integrative Genomics  
Viewer with Java Functionality for Next-Generation Sequencing

Oro Valley

### Immaculate Heart High School

***Minke, Amanda Catherine, 17***

Analyzing the Mechanism and Efficiency for Filtering Pb<sup>2+</sup> Using Freshwater  
Algae - Phase 3

Scottsdale

### Desert Mountain High School

***Saxena, Aakanksha, 17***

The Influence of Contaminants and Secondary Phases on the Optical  
Properties of Iron Pyrite (FeS<sub>2</sub>), a New Candidate for Large Area, Low Cost  
Photovoltaic Cells

## CALIFORNIA

Cupertino

### Monta Vista High School

***Cheerla, Nikhil, 17***

Scoring Regulatory Variants Using Deep Convolutional Neural Networks and  
DeepLIFT

***Saluja, Sajeer, 17***

Simulation and Experimental Verification of Thioflavin-T mediated Reversal of  
Amyloid-like Aggregation

***Talapaneni, Suresh, 17***

A Versatile, Quantitative Means for Post-mortem Diagnosis of Tauopathies  
Using Supervised Machine Learning

Diamond Bar

### Diamond Bar High School

***Chen, Benjamin, 17***

Asymmetric Bipartite Variants of the Erdős Distinct Distances Problem

**Fremont**

**Mission San Jose High School**

***Baral, Jessika, 17***

Machine Learning Tool for Detection of Small Cell Lung Cancer Stage Using Novel Nuclear Factor I/B Expression: Significantly Increase Patient Survival in Less than One Minute

***Zeng, Catherine Yingxuan, 17***

Investigation of H/D Exchange in Aromatic Compounds with a Heterogeneous-Based Electro-Activated Palladium Catalyst

**Irvine**

**Northwood High School**

***Li, Eric Siqi, 17***

The Effect of Structural Parameters on Htt Pathology

**University High School**

***Chattopadhyay, Aurnov, 18***

Sustainable Heavy Metal Remediation Through Novel Nanocellulose Coagulants Synthesized Directly from Raw Biomass

**Woodbridge High School**

***Chang, Annette, 17***

Elucidating a Relationship Between Ligand-Flap Interactions and Drug Potency in HIV-1 Protease with Molecular Dynamics Simulations

**Las Flores**

**Tesoro High School**

***Shah, Shalin Vipul, 17***

Lumos: Automated Smartphone-based Ophthalmic Screening for Glaucoma Using Computer Vision and Deep Learning Algorithms Through Low-cost and Non-mydratic Retinal Fundus Imaging

**North Hollywood**

**Harvard-Westlake School**

***Han, Eric, 17***

4-Dimensional Dynamic Cardiovascular Magnetic Resonance for Pediatric Patients with Congenital Heart Disease

**Oakland**

**The College Preparatory School**

***Pierson, Laura Catherine, 17***

Signatures of Stable Multiplicity Spaces in Restrictions of Representations of Symmetric Groups

**Orinda**

**Miramonte High School**

***Li, Sophia, 17***

Engineering Microdent Structures of Bone Implant Surfaces to Enhance Osteogenic Activity in Mesenchymal Stem Cells

**Palo Alto**

**Henry M. Gunn High School**

***Wang, Jenica, 16***

Bioinformatics Screening of Cell Surface Receptors to Identify New Stem Cell and Prostate Cancer Markers

**Palo Alto High School**

***Hong, Jerry, 17***

Novel Analyses of Volumetric Features of Drusen to Predict Progression of Age-Related Macular Degeneration

**San Diego**

**Canyon Crest Academy**

***Kang, Anthony Kyuwon, 17***

New Antibacterials: Conjugation-Mediated Transmission of Cytotoxic Genes for Targeted Bacterial Cell Elimination

***Merk, Liana Noor, 17***

Increasing Efficiency of Epi 1-(Nmp) Through Temporal Modification and Efflux Induction

***Xia, Brian Siyuan, 16***

Transgenerational Programming of Longevity with a Low-protein Diet: Animal Model, E(Z)/Ezh2-Mediated H3k27me3 and Early-Life “Immunization-Like” Epigenetic Interventions to Prevent Aging-related Diseases Throughout the Adult Life

**Del Norte High School**

***Tian, Jessica C., 17***

Antibacterial Property of Cellulose Paper Decorated with Ag/TiO<sub>2</sub> Nanocomposites

**San Diego Jewish Academy**

***Acks, Eitan, 17***

Developing a Novel ALS Model Using *in vivo* CRISPR Cas9 Genome Engineering in the Nematode *Caenorhabditis elegans*

**Scripps Ranch High School**

***Kim, Janie, 18***

Development of a Low-Cost Hospital Room Disinfection System via SAW Nebulization

**Westview School**

***Han, Edward, 17***

Discovery of Novel IDO1 Inhibitors for Cancer Immunotherapy and Structural Biology Study of Inhibition Mechanism

**San Jose**

**Bellarmino College Preparatory**

***Chang, Kevin Yaolin, 17***

Ordered Ramsey Numbers of Small 1-Orderings

***Ravishanker, Pravin, 17***

ALZCan: Predicting Future Onset of Alzheimer’s Disease Using Polygenic Risk Scores, Cognitive Tests, Cerebrospinal Fluid Biomarkers, and Multiple Neuroimaging Modalities (Resting-State fMRI, FDG-PET, Florbetapir PET)

***Sridhar, Arvind, 18***

Engineering Injectable and Conductive Hydrogels Doped with Graphene and Graphene Oxide Nanoparticles for Post-MI Cardiac Tissue Engineering and Robust Drug Discovery: A Computationally-Aided Investigation for Enhancing Therapeutic Efficacy

**Evergreen Valley High School**

***Selvamurugan, Shanmurugan, 17***

Analyzing the Metallic Tendencies of Terrestrial Planet and Gas Giant Formation and Evolution

**Lynbrook High School**

***Guo, Nicholas, 17***

Rational Hyperplane Arrangements and Counting Independent Sets of Symmetric Graphs

***Hase-Liu, Matthew Manchung Keisuke, 17***

Efficient Point-Counting Algorithms for Superelliptic Curves

***Xiao, Katherine Lin-Kathy, 18***

Integrating Context-specific Epigenetic Information with GWAS Data to Identify Novel Variants Associated with Susceptibility to Basal Cell Carcinoma

***Zhang, Marilyn Mengyao, 18***

Immune Cell-derived Extracellular Vesicles in Culture Model of Inflammation Impose Malignant Phenotypes in Normal Breast Epithelial Cells

**The Harker School**

***Ang, Kai-Siang Matthew, 17***

A Complete Classification of Regular Symmetron Arrangements in the Construction of Icosahedral Virus Capsids

***Kim, Angela Eun-Chae, 17***

Radial Vector Scanning (RVS) Algorithm for Breast Cancer Segmentation

***Nirmel, Sandip, 17***

The Biological Pump in a Changing Climate: Identifying Drivers of Sinking Patterns of Various Antarctic Phytoplankton and Ice Algae

***Pyda, Srivatsav, 17***

Pathology Image Analysis Reveals Gender Subtypes Affecting Patient Survival in Gliomas

***Radiya-Dixit, Evani, 17***

Identification of Diagnostic Biomarkers and Therapeutic Cancer Targets Across Adenocarcinomas Using Genome-wide DNA Methylation Analyses

***Sankar, Venkat, 17***

Tumor-adjacent Tissue in Invasive Breast Cancer: Characterization of Prognostic Significance and Identification of Novel Biomarkers

***Shah, Manan Ajay, 17***

Deep Learning Assessment of Tumor Proliferation in Histopathological Images for Categorical and Molecular Breast Cancer Severity Diagnosis

***Song, Scott, 17***

Development of a Novel Microfluidic System to Study Neurodegenerative Disorders

***Subramaniam, Arjun, 17***

CadML: A New, Computational Approach to Optimizing Antibody Affinity for Design of Antibody Therapeutics

**Santa Cruz**

**Pacific Collegiate School**

***Cheleden, Spencer Michael, 17***

Design and Characterization of Silver-based Nanolaminate Astronomical Coatings

**COLORADO**

**Colorado Springs**

**William J. Palmer High School**

***Bloomfield, Rebecca A., 17***

Grappling with DNA: Competence for Natural Transformation Alters Motility and Enables Survival of Nutrient Deprivation in *Acinetobacter baylyi*

## CONNECTICUT

### Greenwich

#### **Greenwich High School**

##### ***Hallisey, Olivia Anne, 18***

Temperature-Independent, Portable, and Rapid Field Detection of Ebola via a Silk-Derived Lateral-Flow System

##### ***Novek, Ethan Joseph, 17***

Low-Temperature Carbon Capture Using Aqueous Ammonia and Organic Solvents

##### ***Sathish, Sanjeev-Kumar Mamallapuram, 17***

The Optimization of Nanoparticle-based Drug Delivery of Melittin in a Colloidal Suspension as a Selective Method to Target HIV Structural Antigen p24

##### ***Woo, Derek, 17***

Battling Honey Bee CCD via Reduction of Neonicotinoid Content in Guttation Droplets Using Biochar Soil Additives

##### ***Zaminski, Devyn Hasegawa, 17***

Self-Sustaining Biosynthesis of Methane from CO<sub>2</sub> via a Microbial & Electrochemical Hybrid System

##### ***Zhou, Madeleine Yixin, 17***

Selective Improvement of Anti-Cancer Drug Sensitivity via D-Glucosamine Inhibition of STAT3 Oncogenic Expression

### Hamden

#### **Hamden High School**

##### ***Agarwal, Aakshi, 17***

CRISPR Based Gene Editing Confers Resistance to Human Immunodeficiency Virus (HIV)

### Wallingford

#### **Choate Rosemary Hall**

##### ***Lee, Truelian, 17***

Correcting the SPH Mutation in a Preclinical Model of Hereditary Spherocytosis Using Genome Editing

### Westport

#### **Staples High School**

##### ***Mudholkar, Jay Mandar, 17***

Oscillation and Decay in Interfacial Dynamics of a Bubble-laden Viscous Drop

### Woodbridge

#### **Amity Regional High School**

##### ***Handler, Katherine Sarah, 17***

Succession Variations in Kenyan Scavenger Communities and the Importance of Wildebeest Carcasses

##### ***He, James, 17***

The Relationship Between Phonological Processing, Intelligence Quotient, and Reading Cognition: A Behavioral and Neuroimaging Analysis

##### ***Nadelmann, Julia Rachel, 17***

Applying the Friendship Paradox to Trends within a High School Population

## DELAWARE

### Wilmington

#### Charter School of Wilmington

**Sweeney, Connor Jackson, 18**

Aboveground Signaling Manipulates Root-microbe Interaction Responses in the Neighboring Plants

## FLORIDA

### Fort Lauderdale

#### Pine Crest School

**Dardet, Matthew Edward, 18**

Utilizing a *D. melanogaster* Electroconvulsive Assay to Screen for Novel Antiepileptic Compounds

**Geller, Jared Matthew, 17**

New Patterns in the Continued Fraction Expansion of Various Infinite Series Through the Lens of Semi-Folding Symmetry

### Miami

#### Dr. Michael M. Krop High School

**Levy, Maya Miriam, 17**

Accuracy of Non-Invasive Continuous Glucose Nanosensor for *Ex-Vivo* Artificial Pancreas

### Orlando

#### Lake Highland Preparatory School

**Gallagher, Julia Elisabeth, 17**

Formation of Deoxyribozyme Sensors for Biological Marker Detection

**Madan, Vrinda, 17**

Identification of Highly Selective Anti-malarial Compounds and Characterization of Mechanisms of Action

**Nandwani, Anjali Vashi, 18**

The Effects of *Azadirachta indica* and *Dysphania ambrosioides* on Whiteflies and Nematodes

**Shah, Nirja N., 17**

Analysis of Optical Depth by Studying the Relationship among  $\tau$ , Feature Width, and Particle Size in Saturn's Rings

### Plantation

#### American Heritage School

**Kannan, Suganth, 17**

Development of an Algorithm to Filter and Assign Signals in Protein NMR Spectroscopy to Accelerate Drug Discovery

### Stuart

#### South Fork High School

**Jakhete, Shantanu, 16**

Novel Mosquito Control: Comparing Rates of Capture Between Auditory and Visual Stimuli for Improving Management of *Aedes aegypti*, a Vector of Zika Virus

### West Palm Beach

#### Alexander W. Dreyfoos, Jr. School of the Arts

**Wan, Stefan, 17**

Functionalizing Biochar with Mg-Al and Mg-Fe Layered Double Hydroxides for Phosphate Removal from Aqueous Solutions

### Winter Park

#### Trinity Preparatory School

**Yang, Amber Zoe, 17**

Orbital Recognition System for Space Debris Tracking Using Artificial Neural Networks – A Journey from Inner-Brain GPS to Outer-Space GPS



## GEORGIA

### Evans

#### **Greenbrier High School**

***Kirov, Alexander S., 17***

Exosomes in Amyloid Aggregates Promote Neuronal Damage: A Mechanism of Alzheimer's Pathology

### Norcross

#### **Norcross High School**

***Wang, Jennifer Lynn, 17***

Lose the Battle but Win the War: Generous Zero-Determinant Strategies in the Iterated Prisoner's Dilemma

## HAWAII

### Hilo

#### **Waiakea High School**

***Peng, Felix Cheng, 17***

Isolation of a Novel Marine Microorganism Capable of Aromatic Hydrocarbon Degradation in East Hawai'i

### Honolulu

#### **Kalani High School**

***Lindsay, Christopher James, 17***

Hohonukai: Environmental Studies of Marine Biota Using Underwater Time-Lapse Photography and Multiple Camera Arrays

### Ho'olehua

#### **Moloka'i High School**

***Jenkins, Lily Nalulani, 17***

Sea Level Rise and March of the Molokai Mangrove: Using Geospatial Technology to Analyze the Socioeconomic and Environmental Effects of Red Mangrove and Sea Level Rise on Molokai, Hawaiian Islands

## ILLINOIS

### Aurora

#### **Illinois Mathematics and Science Academy**

***Sivakumar, Pranav, 16***

Searches for Almost Dark Galaxies in Blank Sky Fields with the Sloan Digital Sky Survey

***Upadhyayula, Pranav Aadithya, 17***

Rethinking Depression Treatment: A Study on the Intra-Subject Variability in Resting-State fMRI and the Development of a Novel Computational Tool to Improve Transcranial Magnetic Stimulation for Major Depressive Disorder Treatment

***Verma, Neha, 17***

Innervation of Pathway-specific Striatal Spiny Projection Neurons by Npas1+ Neurons of the External Globus Pallidus

#### **Waubonsie Valley High School**

***Salegame, Rajath Dinesh, 17***

ROS-mediated Oxidative Stress Induces  $\alpha$ -tubulin Detyrosination in Osteosarcoma and tsA201 Cells

### Chicago

#### **Walter Payton College Preparatory**

***Farb, Beatrice Henrietta, 17***

From the Jerk to the Role Model: Large-scale Analysis of a Personality Inventory

**Rockford**                      **Keith Country Day School**  
***Wang, Allison B., 17***  
 Unintentional Repercussions of Democracy: Voter and Student Demographic Misbalance Is Linked to Poor Student Performance

**Winnetka**                      **New Trier Township High School**  
***Yang, Jason, 17***  
 Cost-Effective, Scalable Nanoscale Patterning via Spin Coating of PMMA and Analysis of Feature-Size Tunability

## INDIANA

**Carmel**                      **Carmel High School**  
***Wang, Michael Chen, 17***  
 A Generalized HHI and Its Application to the Financial Industry

**Evansville**                      **Signature School**  
***Dhawan, Arjun K., 17***  
 Object Recognition for the Visually Impaired - Use of 3D Sensors to Help the Blind "See"

**West Lafayette**                      **West Lafayette Junior-Senior High School**  
***Ramani, Arjun Srinivasan, 18***  
 Fast Sampling of Stochastic Kronecker Graphs

## KENTUCKY

**Louisville**                      **duPont Manual Magnet High School**  
***Paladugu, Praharshasai, 17***  
 Development of Low Cost Paper-based Point-of-Care Platform for Quantitative Biomarker Analysis

***Venkatakrishnan, Mukund, 17***  
 Development of a Low-cost, Open-source Integrated Hearing Test and Hearing Aid

## MAINE

**Bangor**                      **Bangor High School**  
***McDonald, Sydney Victoria, 17***  
 The Future of Prosthesis: The Design and Analysis of Artificial Muscle Comprised of Ionic-polymer Metal Composites

## MARYLAND

**Baltimore**                      **Baltimore Polytechnic Institute**  
***Zhang, Amy, 17***  
 Self-Folding Motile Encapsulating Microdevices for Use in Single-Cell Analysis

**Bethesda**                      **Walt Whitman High School**  
***Rekhtman, David Boris, 18***  
 A Study of the Induction of Immunogenic Cell Death in Response to Local Ablative Therapies of Cancer

**Clarksburg**                      **Clarksburg High School**  
***Ganesan, Anurudh Ramanan, 17***  
 VAXXWAGON: An Innovative "No Ice, No Electric" Active Refrigeration System for Last-Leg Vaccine Transportation

Clarksville	<p><b><u>River Hill High School</u></b>  <b><i>Kannan, Gokul Ramanujam, 17</i></b>  Triggering the Brain to Heal Itself after Traumatic Brain Injury: Where Glia, Anesthesia and Nanomedicine Meet</p>
Ellicott City	<p><b><u>Centennial High School</u></b>  <b><i>Huang, Kevin Shengyi, 17</i></b>  Performing Joint Measurements on Electron Spin Qubits by Measuring Current Through a Nearby Conductance Channel</p> <p><b><i>Li, Tingyu, 17</i></b>  Nanoparticle Encapsulated Glutaminase Inhibitor for the Treatment of Pancreatic Ductal Adenocarcinoma</p> <p><b><i>Rabb, Neil Nabil, 17</i></b>  Use of a Novel Human Enteroid Model System Identifies Specific Genes that Distinguish Obese from Lean Subjects</p> <p><b><u>Mount Hebron High School</u></b>  <b><i>Pandey, Shivani S.R., 17</i></b>  Understanding the Environmental Implications of Triclosan Degradation: Characterization of a Set of TCS-Degrading Bacteria</p>
Frederick	<p><b><u>Governor Thomas Johnson High School</u></b>  <b><i>Yamaguchi, Evan Paul, 17</i></b>  An Achilles Heel in Oncogenic Ras Signaling</p>
Poolesville	<p><b><u>Poolesville High School</u></b>  <b><i>Cho, Kathleen Mi-Young, 17</i></b>  The Utility of Prospect Theory and the Development of an Explanation for Risk Behaviors Under Psychosocial Manipulations and Narrative Engagement</p> <p><b><i>Mundra, Ishan Satish, 17</i></b>  Development and Testing of a Thermal Evaporator for Applications in Photocathode Coating</p> <p><b><i>Wang, Richard, 17</i></b>  Computer Simulation of Protein Folding Using the 3D Hydrophobic-Polar Lattice Model</p>
Rockville	<p><b><u>Richard Montgomery High School</u></b>  <b><i>Xu, Frederick H., 17</i></b>  PEGylated Polypeptides as Non-Viral Vectors for CRISPR-Cas9 Gene Delivery</p>
Silver Spring	<p><b><u>Montgomery Blair High School</u></b>  <b><i>Chattopadhyay, Sambuddha, 17</i></b>  On T-Reflection via Analytic Continuation in Quantum Mechanics</p> <p><b><i>Chen, Ethan Edgar, 17</i></b>  Analyzing the Effect of Matrix Architecture and Proteolytic Degradation on Fibroblast and Tumor Cell Migration</p> <p><b><i>Chen, Richard, 18</i></b>  Design, Build, and Implementation of a Triple Langmuir Probe for a Superconducting Helicon Thruster</p> <p><b><i>Dalvi, Rohan, 17</i></b>  Kinetic Trapping and Structural Determination of Native-State Biomolecules in the Gas Phase</p>

***Do, Dawson, 18***

Digital Preparation and Description of the Braincase of a New and Unique Ornithischian Dinosaur

***Ehrenstein, Samuel Isaac, 17***

Creation of an Emittance-Dominated Electron Beam via Collimating Apertures

***Guo, Raymond Lei, 17***

Puromycin Selection with Lentiviral Transduction Causes Widespread and Significant Changes in RNA-Seq Profiles of Primary Human Erythroblasts

***Kern, Garret Woods, 18***

A Global Analysis of Oseltamivir Resistance in 2009 Pandemic H1N1 Influenza Viruses

***Lu-Yang, Juliana, 17***

Exploring Carbon Isotope Exchange Kinetics Between Carbonate and Carboxylic Acids Under the Hydrothermal Conditions of Carbonaceous Chondrites

## MASSACHUSETTS

### Andover

**Phillips Academy**

***Yue, Albert S., 17***

An Index-Type Invariant of Knot Diagrams and Bounds for Unknotting Framed Knots

### Belmont

**Belmont Hill School**

***Daley, John Edmondson, 18***

Maturation of the Endoplasmic Reticulum Translocon Complex In Stem Cell Derived Beta Cells

***Kaneb, Andrew Albert, 18***

Whole Exome and Whole Genome Sequencing of Central Neurocytoma

### Groton

**Groton School**

***Kendall, Isabel Maria, 18***

Canaries in a Coal Mine: An Analysis of Genotypic and Phenotypic Variation in Populations of Red Back Salamanders (*Plethodon cinereus*) in Eastern Massachusetts as an Indicator of Ecosystem Resilience

### Lexington

**Lexington High School**

***Gopalakrishnan, Vivek, 17***

Reduced Body Fat Accumulation and Decreased Viability: The Effects of Epigallocatechin Gallate on *Caenorhabditis elegans*

***Murthy, Veda, 17***

Towards a More Accurate Convolutional Neural Network (CNN) to Classify Glioma Nuclear Images

### Sheffield

**Berkshire School**

***Blomquist, Viggo Gustaf, 18***

A Novel Suppression Technique of Premature Termination Codons and its Application to Congenital Long QT Syndrome 2

### West Roxbury

**The Roxbury Latin School**

***Wang, Felix, 18***

Functional Equations in Complex Analysis and Number Theory

## MICHIGAN

### Ann Arbor

#### Greenhills School

**Wellman, Julian, 18**

Lower Bounds on Davenport-Schinzel Sequences via Rectangular Zarankiewicz Matrices

### Beverly Hills

#### Detroit Country Day School

**Siddiqui, Omer Vaqar, 17**

Strong Matching Preclusion of Arrangement Graphs

## MINNESOTA

### Rochester

#### John Marshall High School

**Marda, Nikhil Raj, 18**

On Equal Point Separation by Planar Cell Decompositions

### Saint Paul

#### Highland Park Senior High School

**Rajamani, Geetanjali, 17**

Controlling Noxa Protein Expression by a Novel Approach to Study its Function in Leukemic Cells

## MISSISSIPPI

### Oxford

#### Oxford High School

**Chao, Sichen, 17**

Developing a Numerical Box Model to Calculate Algae Concentration

## NEVADA

### Las Vegas

#### Edward Clark High School

**Zhang, Rachel Chir, 16**

Numerical Model of the Evolution of Exoplanet Adjacent Orbital Period Ratio Distribution

### Reno

#### The Davidson Academy of Nevada

**Rohatgi, Dhruv Warke, 16**

When Two-Holed Torus Graphs Are Hamiltonian

## NEW HAMPSHIRE

### Exeter

#### Phillips Exeter Academy

**Sun, Alec, 18**

Infinite-Dimensionality of Certain Representations of Rational Cherednik Algebras of Type D

### Nashua

#### Nashua High School

**Zhu, Mary, 18**

Impact of Carbon Tax Policies on the Global Agricultural Economy: A Computational Spatial Partial Equilibrium Modeling Approach

## NEW JERSEY

### Chatham

#### Chatham High School

**Sinha, Nishita, 17**

Experimental Studies in Developing Safe Sanitation Solutions

### Hackensack

#### Academy for Business and Finance

**Jiang, Enoch, 17**

Glutamine Addiction: An Achilles Heel for Myc-Overexpressing Breast Cancer

**Academy for Medical Science Technology**

***Das, Indrani, 17***

Exosomal miR-124a: Novel Translational Astrocyte Repair in Reactive Astrogliosis *in vitro*

***Fang, Jacy, 17***

The Living Drug: A Novel Method of Inducing Stem-Like Memory T Cells from Antigen-Experienced Cells for CAR-T Immunotherapy

***Lee, Jiwoo, 17***

The “Smart Cancer Drug”: Targeting Cancer’s Achilles’ Heel with Conditional CRISPR/Cas9

***Ping, Christina, 17***

Photosynthetic Production of Thyroglobulin from Inter-Kingdom Thyroid-Algae Hybrid Cells

***Subramaniam, Varun Ramanan, 16***

A Novel *in vitro* Approach to Inducing Oxidative Stress Using UV Radiation in Neuronal Cells and Its Protection by Curcumin

**Academy for the Advancement of Science and Technology**

***Fong, Andrew Kevin, 17***

FBXO-25: A Prognostic Indicator of Effective Cancer Treatment

***Gjerswold-Selleck, Sabrina Josefina, 17***

The Effect of hnRNPM on EMT and Breast Cancer Metastasis

**Jersey City**

**Dr. Ronald E. McNair Academic High School**

***Weaver, Jackson Barker, 17***

The Electrifying Speed of Enzymes

**Lincroft**

**High Technology High School**

***Yatvitskiy, Jacob, 17***

A Mathematical Model to Analyze Neurotransmitter Interactions in the Human Central Motor Control System

**Millburn**

**Millburn High School**

***Waung, Isabella, 18***

Histone Methyltransferase as a Target for the Radiosensitization of Cancer Cells

**Princeton**

**Princeton High School**

***Kang, Ji Young, 18***

Impacts of *Phragmites australis* Invasion on Soil Enzyme Activities and Methanogens of Tidal Marshes

**Tenafly**

**Tenafly High School**

***Hyslop, Jack Henry, 17***

Design and Construction of a Cost Effective Robotic Fish that Measures pH, Temperature, Altitude, Wave Frequency, GPS with Obstacle Avoidance

**Warren**

**Watchung Hills Regional High School**

***Lee, Daniel C., 17***

Energy Balance in Discharges in Underwater Gas Bubbles

## NEW YORK

### Armonk

#### **Byram Hills High School**

##### ***Bayley, Yasamin Sophia, 17***

Species-specific Responses of Coccolithophores' Growth Rates and Calcification to Various Light Intensities: A Comparative Study of the Species *Emiliana huxleyi* and *Coccolithus pelagicus*

##### ***Chong, Isabelle, 17***

Using an Inertial Navigation System and a Laser Range Finder to Create a Novel Electronic Navigational Aid for the Blind

##### ***Saltzman, Audrey, 17***

Swift XRT and UVOT Investigation of Low-mass X-ray Binary 1RXS J180408.9-342058

### Bellmore

#### **John F. Kennedy High School**

##### ***Kelly, Claire Dorothy, 17***

Impulsivity as a Predictor for Enhanced Attention towards Novel Drug-paired Cues

##### ***Rakhimov, Jennifer Elizabeth, 17***

Mitochondrial Replacement Therapy in Degenerated Retinal Pigment Epithelial Cells

##### ***Sternbach, Michael Dylan, 17***

Are Yield Curve Inversions Harbingers of Economic Contractions in Emerging Market and Excessively Debt-Ridden Countries?

### Bronx

#### **Bronx High School of Science**

##### ***Devraj, Nikhil, 17***

New Algorithm for Computational Diagnosis of Medical Diseases with Framework for Artificial Intelligence Implementation

##### ***Foo, Ryan Matthew, 17***

The Effects of Mother-Infant Interactions on Infants' Transition from Crawling to Walking

##### ***Gibbons, Aidan Russell, 18***

Modeling the First Ever Molecular Explanation behind Commercially Feasible Hydrogen Sensors to Stimulate the Hydrogen Powered Automobile Market (a Density Functional Theory Approach)

##### ***Greco, Isabella Iris, 17***

The Effect of Gender Stereotype and Stereotype Inconsistency on False Memory of Occupation Descriptions

##### ***Sakhrani, Neeraj, 17***

Mathematically Cutting to the Bone: Solving Analytical Problems in ESR Dating the Paleolithic Site at Isimila, Tanzania

##### ***Stefanakis, George, 17***

A Novel Methodology Addressing Two Major Obstacles in Developing the Elusive Quantum Computer

##### ***Zhang, Tyrone, 17***

A Novel Mathematical Model for Ice Storms

<b>Brooklyn</b>	<p><b><u>Brooklyn Technical High School</u></b>  <b><i>Huang, Irwin, 17</i></b>  The Effects of Decoherence and Dephasing on the Quantum Random Walk</p>
<b>Commack</b>	<p><b><u>Commack High School</u></b>  <b><i>Cooper, Jordan Zachary, 17</i></b>  The Efficacy of a Rational Combination of BCL6-BTB and Survivin Inhibitors in Diffuse Large B-cell Lymphoma</p> <p><b><i>Cuomo, Abbigayle Emily, 17</i></b>  A Study of Westward Recurving Tropical Cyclone Tracks in the Atlantic</p>
<b>Cross River</b>	<p><b><u>John Jay High School</u></b>  <b><i>Guo, DeeAnn, 17</i></b>  Lucid Dreaming: Its Electrophysiological Correlates and Induction Through Multiple Awakenings</p>
<b>Dix Hills</b>	<p><b><u>Half Hollow Hills High School East</u></b>  <b><i>Rizvon, Alia Fatima, 17</i></b>  A Potential Role for CCDC11 in Cytokinesis Evidenced Through Colocalization with Acetylated <math>\alpha</math>-Tubulin Adjacent to Midbody During Abscission</p> <p><b><i>Anton Wu, 16</i></b>  Discrete Ricci Flow on Discrete 3–Manifolds</p> <p><b><u>Half Hollow Hills High School West</u></b>  <b><i>Kim, Daniel D., 17</i></b>  Engineering a Highly Applicable Base Isolating Structural Layer Using Topology Optimization and Additive Manufacturing</p> <p><b><i>Zakoworotny, Michael, 17</i></b>  The Effect of Temperature on the Particle Orientation of Kaolinite Clays</p>
<b>Dobbs Ferry</b>	<p><b><u>Dobbs Ferry High School</u></b>  <b><i>Hord, Blake, 17</i></b>  High Mass Planet Spiral Shocks as a Source of Infrared Emission from Protoplanetary Disks</p> <p><b><u>The Masters School</u></b>  <b><i>Li, Mingyu, 19</i></b>  Defluoridation Study of High Fluorine Drinking Water by Activated Alumina Oxide Modified by Ferric Sulfate</p>
<b>East Setauket</b>	<p><b><u>Ward Melville High School</u></b>  <b><i>Liu, Albert Yan, 17</i></b>  Anomaly Detection in Time Series of Dependent Stochastic Block Model Graphs</p> <p><b><i>Nath, Kirti, 17</i></b>  Assessing the Developmental and Metabolic Toxicity of Neuroactive Pharmaceuticals Using Early Life Stage Zebrafish (<i>Danio rerio</i>)</p> <p><b><i>Tangella, Kavya Lakshmi, 17</i></b>  Hearing Sounds, and the Illusion of Seeing Longer-Lasting Shapes</p> <p><b><i>Tkachenko, Nestor, 17</i></b>  Can Cars Fly? Eddy Current Levitation as Viable Technology</p>



**Great Neck****John L. Miller Great Neck North High School*****Gao, Patrick, 17***

Development of an Automated Feedback Loop for the Geometric Stabilization of Taylor Cones in Low Flow-Rate Magnetoelectrosprays

**William A. Shine Great Neck South High School*****Hlaing, Lynn, 17***

Modulating LRRK2 Kinase Domain Through an FDA Approved Compound

***Ko, Matthew, 17***

Extraction of the Specific Shear Viscosity of the Quark-Gluon Plasma from Measurements of Flow Harmonics in Au + Au Collisions at 200 GeV

***Lundelius, Olivia Ann, 17***

Sorting Microfossil Concentrate under Ultraviolet and Daylight Conditions Using a Support Vector Machine

***Smith, Rubin Asher, 17***

Modeling Topography and Mammal Species Diversity within the Western U.S Basin and Range from 36Ma.

***Su, Yujia, 18***

Groundwater Contaminant EDC: A Potential Hazard on Human Nervous System

***Zhang, Jaysen, 17***

A Cell Culture Model of Glutamine Addiction in Cancer via the c-Myc–Sirt5–Glutaminase Axis

**Hewlett****George W. Hewlett High School*****Perkins, Matthew Raymond, 17***

Alpha and Beta Adrenergic Agonists Increase Hindrance to Diffusion of 3-kDa Dextran in Mouse Visual Cortex Extracellular Space

**Jericho****Jericho Senior High School*****Fu, Ruiwen, 18***

Potent Treatment of Renal Fibrosis: A Novel Inhibitor of Hipk2-Smad3 Interaction

***Hu, Grace, 17***

Advanced Au-SPIONs: Synthesis and Comparison of Multifunctional Nanoparticles for Personalized Nanomedicine

***Kim, Justin, 17***Tannic Acid and its Synthetic Derivatives for Enhanced  $\beta$ -Lactam Antibiotic Susceptibility Through  $\beta$ -Lactamase Inhibition***Lee, Nathaniel Paul, 17***

Novel Femtosecond ZnSe Ceramic Based Optical Parametric Oscillators: Cost-Effective Lasers for Infrared Spectroscopy Applications

***Li, Sandra, 16***

Elucidating Cancer Racial Health Disparities: The Differential Response of African and Caucasian American Colon Cancer Cells to Vitamin E

***Pahlavan, Adam Arash, 17***

Connecting the Spin-Diluted Ising Model to Bacterial Chemotaxis: A Cluster-Based Approach to Characterizing Chemoreceptor Dynamics

***Sang, Brian, 17***

Remediation of Aqueous Organic Contaminants: Sorption Coefficient Comparison of Various  $\beta$ -Cyclodextrin Modified Zeolites and Unmodified Zeolite

***Verma, Archana, 17***

Spin-orbit Coupling Induced Heterogeneous Excited State Dynamics in 6-Coordinate Transition Metal Protodyes

***Wang, Zhitong, 17***

Computational Modeling of Neuronal Networks: Clarifying Neural Dynamics for Neuropathological Investigations

**Lincolndale**

**Somers High School**

***Worsley, Mark Christopher, 17***

Bio-Inspired Airfoil Modifications and Their Effect on Noise and Sound Production of Wind Turbines

**Locust Valley**

**Locust Valley High School**

***Catalano, Michael, 17***

The Use of Double Stranded RNA for Silencing Genes in *Caenorhabditis elegans*: Decoding the Epigenetic Mechanisms of Autism

**Mamaroneck**

**Mamaroneck High School**

***Katz, Andrew Absher, 18***

Implementation of Active and Passive Defenses on an Open Source, Raspberry Pi-based Home Automation Gateway/Internet of Things Device

**Manhasset**

**Manhasset High School**

***Gilja, Riya, 17***

Biodegradable Drug Eluding Stents vs. Drug Eluding Stents vs. Bare Metal Stents: A Comparative Study on Coronary Stenting

***Lee, Michael Yoo-min, 18***

MFT: Improving Shallow CNN Object Tracking with Domain-Separated Feeds

***Van Roy, Parker, 17***

Differing Forms of Capillaries on Liquid Draw Height and an Expansion upon Young's Law

**Montrose**

**Hendrick Hudson High School**

***Chung, Jonathan H., 17***

Interaction of Circulating Gut Microbiota-generated Metabolites with the Function and Expression of SLC6A3, the Dopamine Transporter

***Porras, Melanie C., 17***

Analyzing the Role of Chlorophyll *a*, *b*, and *d* in Oxygenic Photosynthesis

**New Hyde Park**

**Herricks High School**

***Chen, Alan, 17***

Understanding the Mobility of Important Trace Elements During Basalt Weathering with Implications for the Mars 2020 Rover Mission

***Jung, Bongseok, 17***

Investigating the Therapeutic Potential of Simultaneous COX2 and Bcl-2 Inhibition: Using Salicin and ABT-199 to Propose a Safe, Selective, and Potent Treatment Approach for Colorectal Cancer

**Koe, Nora, 17**

Shorter Shares for Formula Secret Sharing

**Mehta, Setu, 17**

IRF5 Deficiency Leads to Increased Proliferation in Luminal Epithelial Cells, Contributing to Mammary Tumorigenesis

**Tan, Natalie Patricia, 18**

The Effect of Titanium Dioxide Nanoparticle Exposure on Undifferentiated and Differentiated U937 Cell Susceptibility to *Staphylococcus aureus* infection and Dextran Bacterial Antiadhesive Properties in Adipose-derived Stromal Cells

**New York**

**Hunter College High School**

**Cohen, Alexander, 17**

Searching Large Hypothesis Spaces by Asking Questions

**Crook, James David, 17**

An Analysis of Low-Surface-Gravity Brown Dwarfs and Field Dwarf Color

**Hu, Serina, 16**

Molecular Dynamics Simulations of the Interactions Between the Collagen Triple Helix with Water in the Presence of Sodium Chloride Ions

**Li, Dylan, 17**

Designing and Testing a Compound Targeting the Divergent Roles of Adipose PPARGAMMA Isoforms in Regulating Metabolic Homeostasis

**Lu, Nancy, 17**

Engineering of Polysaccharide Based Nanoparticles for Theranostic and Antibacterial Applications

**Manhattan Hunter College - High School of Science**

**Herndon, Liam Kai, 17**

Molecular Evolution of a More Highly-Expressed Fluorescent Protein: Improving GFP Translation and Stability Using a Bacterial Model System

**Marymount School of New York**

**Lin, Caroline Miyake, 17**

Next Generation Sequencing of Urine Specimens: A Novel Platform for Genomic Analysis in Patients with Non-Muscle Invasive Bladder Cancer Treated with Bacillus Calmette-Guerin

**Stuyvesant High School**

**Kucher, Phillip Lvovich, 17**

High-frequency Polymorphisms Found in Double-stranded DNA Viruses Suggest Coevolution with a Uniquely Diverse Set of Bacterial Hosts

**Lin, Sharon, 18**

A Novel Multiparameter Optical Sensor Using CMOS Imaging and Remote Neural Networks for Microbial Analysis

**North Bellmore**

**Wellington C. Mepham High School**

**Jozwik, Rachel Elizabeth, 17**

Correlation Between the rs53576 SNP and Stress Levels in High School Students

**Oceanside**

**Oceanside High School**

**Gershengorin, Nathan, 17**

Characterization of Disease Associated Mutations in Human Sugar Transporter GLUT2

<b>Ossining</b>	<b><u>Ossining High School</u></b> <b><i>Khoo, Celine Xin Huan, 17</i></b> Training Nonnative Speech Contrasts: An Examination of English Vowel Contrast Discrimination for Adolescent Native Spanish Speakers
	<b><i>Komosa, Reid Langford, 17</i></b> Tributary Detection as the Basis for Intra-estuarial Juvenile American Eel Recruitment Disparities in the Hudson River
	<b><i>Scanteianu, Adriana Alexandra, 17</i></b> Predicting Protein Turnover Using Genome-Scale Protein-to-mRNA Concentration Ratios
<b>Pittsford</b>	<b><u>Pittsford Mendon High School</u></b> <b><i>Hu, Alexander, 17</i></b> Designing a Microfluidic Device for Water Purification via Inertial Separation of Pathogens
<b>Plainview</b>	<b><u>Plainview-Old Bethpage John F. Kennedy High School</u></b> <b><i>Mathew, Vincy, 18</i></b> A Comparison of Cerebellar Lobules Across Primates Species Reveals the Evolutionary Seeds of Human Intelligence
<b>Pleasantville</b>	<b><u>Pleasantville High School</u></b> <b><i>Malfa, Ana Claire, 17</i></b> Inhibition of the Notch Signaling Pathway Prevents Alveolar Rhabdomyosarcoma Disease Progression
<b>Port Washington</b>	<b><u>Paul D. Schreiber High School</u></b> <b><i>D'Alonzo, Samantha Victoria, 17</i></b> Statistical Modeling and SIR Modeling in New York State Counties of Syndrome X Based on Text Based Indicators from Social Media and Food Environment
	<b><i>Kogan, Maria, 17</i></b> Constructing a Viral Integration Visualizer: An Application for Analyzing the Patterns of Viral Integrations and Their Impact on Surrounding Genes on the Human Genome
	<b><i>Langone, Dylan Raine, 17</i></b> A Search for Astrophysical Gravitational Waves Using LIGO S6 Data
	<b><i>Nachman, Michael William, 17</i></b> An Analysis of Presidential Primaries as General Election Predictors
	<b><i>Seidman, Lauren Isabelle, 17</i></b> Doctor Facilitated Denial: A Barrier to End of Life Planning Among COPD Patients
	<b><i>Winter, Allison Deen, 17</i></b> Neurogenesis in the Dentate Gyrus
<b>Rochester</b>	<b><u>Allendale Columbia School</u></b> <b><i>Morse, Nathan Douglas, 17</i></b> Frequency Conversion Crystal Designs for Improved Ultraviolet Power Balance on the 60-Beam OMEGA Laser
	<b><u>Joseph C. Wilson Magnet High School</u></b> <b><i>Kehoe, Webster Edouard, 18</i></b> Beam Pointing Optimizations for Omega Implosions

**Roslyn Heights**

**Roslyn High School**

***Kim, Yena, 18***

Should Men “Woman Up” for Female-Dominated Fields? The Effect of Gendered Traits on Perceptions of Elementary School Teachers

**Saint James**

**Smithtown High School East**

***Kumar, Vishrath, 17***

Tune Jump Quadrupole Strength Optimization for AGS Polarization Preservation

***Nemeth, Erika, 17***

Cell-Based Delivery of Gene-Silencing Products via Gap Junction

***Peterson, Emily Ann, 17***

Lecithin-Retinol Acyl Transferase in Squamous Cell Carcinoma: The Relationship Between Oncology and Wound Repair

***Zhong, Ruisi, 17***

Activation of Ventral Subiculum Neurons by Cued Emotional Learning

**Scarsdale**

**Edgemont High School**

***Paskov, Alexander Spassimirov, 17***

New Frontiers in Toxicogenomics Based on Fused Regularization and Rank Restricted Machine Learning

***Rozental, Stefano Freitas Andrade, 17***

Language Lateralization Using Electroencephalography

***Wexler, Jocelyn Hallie, 17***

Laparoscopic Roux-en-Y Gastric Bypass Versus Laparoscopic Sleeve Gastrectomy for the Resolution of Obesity-Related Comorbidities: A New Method of Comparison

**Scarsdale High School**

***Li, Dexin, 17***

Decision-Making, Misperceptions, and Gender: Chess Players and How They Take Risks

***Singer, Lauren Hallie, 17***

Transient Visual Evoked Potentials as a Novel Biomarker for Autism and Phelan-McDermid Syndrome

**South Huntington**

**Saint Anthony's High School**

***Koch, Christopher Michael, 17***

The Development of an AC Magneto-Optic Kerr Effect Magnetometer to Study Yttrium Iron Garnet Thin Films

**Syosset**

**Syosset High School**

***Canarick, Adam, 17***

Assistive Tennis Technology

***Mehta, Rushabh, 17***

Exact Radial Muon Orbit Distortion with E821  $\beta$ -Function

***Rhee, Ben S., 17***

An Analysis of Power Dissipation in Extratropical Cyclones

***Samantaray, Yash, 17***

Impact of Coating Dithiocarbamate-Protected Ruthenium Nanoparticles on the Nafion® Membrane in the Performance of a Polymer Electrolyte Membrane Fuel Cell – a Novel Approach

<b>West Sayville</b>	<b><u>Sayville High School</u></b> <b><i>Gormley, Caitlin Elizabeth, 17</i></b> Geospatial Analysis of Hydrofracturing Activities Related to Human Health Outcomes and Seismic Activity in the USA
<b>Westbury</b>	<b><u>Walter Tresper Clarke High School</u></b> <b><i>Joseph, Alby John, 17</i></b> Optimized Fatty Acid Binding Protein Inhibitors: Augmenting the Viability of a Novel Pain-Relief Mechanism
<b>White Plains</b>	<b><u>White Plains High School</u></b> <b><i>Zhu, Shelley, 17</i></b> Assessing Schwann Cell Biology <i>in vitro</i> to Assess Its Potential for Brain Hemorrhage Cell Transplantation Therapy

## NORTH CAROLINA

<b>Charlotte</b>	<b><u>Charlotte Latin School</u></b> <b><i>Yang, Michael, 18</i></b> Modelling Protein Population Interactions for Rapid Investigation of Collective Behavior
<b>Durham</b>	<b><u>North Carolina School of Science and Mathematics</u></b> <b><i>Allen, Alexander Ray, 17</i></b> Enhancement of Second Harmonic Generation by Localized Surface Resonance Plasmons  <b><i>Clyburn, Anna Margaret, 17</i></b> Investigation of Phytoestrogens as Treatments for Estrogen-Receptor Negative Breast Cancer  <b><i>Deng, Angela, 16</i></b> Growth of Representation Dimensions in Auslander-Reiten Quivers of Euclidean Quivers  <b><i>Li, Dory, 17</i></b> Diblock Protein-coated DNA Nanostructures: Development and Application in Drug Delivery  <b><i>Uzsoy, Ana Sofia Mendez, 17</i></b> Drastic Conditions Call for Drastic Measures: The Viability of Terrestrial Extremophiles in Simulated Martian UV Radiation  <b><i>Westendorff, Karl Speas, 17</i></b> Photocatalytic Applications of Zirconium-Based Metal Organic Frameworks
<b>Greensboro</b>	<b><u>Northern Guilford High School</u></b> <b><i>Laffan, Claire Elizabeth, 17</i></b> Monte Carlo Investigation of 2D Ferromagnetic Models
<b>Greenville</b>	<b><u>Junius H. Rose High School</u></b> <b><i>Huo, Lily, 17</i></b> Impacts of TiO <sub>2</sub> and CuO nanoparticles on Germ Cell Apoptosis: Dysregulation of Mitochondrial Genes

## OHIO

<b>Beachwood</b>	<b><u>Beachwood High School</u></b> <b><i>Srinivasan, Swathi Ravi, 17</i></b> Evaluating the Relationships Between Micronutrients in Spices and Alzheimer's Disease Through Biochemistry and Bioinformatics Approaches
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## Chagrin Falls

### **University School**

***Lane, Graham Scott, 18***

Prostatic Acid Phosphatase is a Non-Selective Ectonucleotidase in RIP 1 deficient Human Jurkat T Cell Leukemia and EG7 Murine Thymoma Tumor Cells

## Shaker Heights

### **Hathaway Brown School**

***Howarth, Madeline Anne, 17***

Identification of Macrophage Phenotypic response Around Neuronal Cell Bodies After Peripheral Nerve Injury

***Solt, Zoe Isabella, 17***

Domain Wall Motion in Concave Ferromagnetic Nanowires

## OKLAHOMA

### Tulsa

### **Cascia Hall Preparatory School**

***Bingham, Beau Taylor, 17***

Analysis of the Antimicrobial Efficacies and Structural Characteristics of Fractional Components of Selected Algal Extracts

## OREGON

### Eugene

### **South Eugene High School**

***Wang, Melissa Annjing, 17***

A Memory-Dependent Reinforcement Learning Model for Dynamic Foraging

### Portland

### **Jesuit High School**

***Karamchedu, Chaitanya Dasharathi, 17***

Addressing Global Water Scarcity with a Novel Hydrogel Based Desalination Technique Using Saponified Starch Grafted Polyacrylamide's Hydrophilic Properties to Harvest Fresh Water with a Low Energy and Chemical Footprint

### **Lincoln High School**

***Leng, Alec Maxwell, 17***

Independence of the Miller-Rabin and Lucas Probable Prime Tests

### **Oregon Episcopal School**

***Edepuganti, Vineet, 17***

Development of a High-Performance Biodegradable Battery for Transient Electronics

### **Westview High School**

***Lee, Bryan, 17***

Novel Quantum Machine Learning Based on Minimum Kronecker Reed-Muller Forms and Grover's Search Algorithm with Hybrid Oracles

***Mallidi, Ajitha, 17***

Gabapentin with Gradual Extinction: An Effective New Treatment Method to Reduce Alcohol-Seeking Behavior

## PENNSYLVANIA

### Berwyn

### **Conestoga High School**

***Jiang, Kelly Jia En, 17***

Development of a TERT Mutation Assay for Liquid Biopsy of Hepatocellular Carcinoma

<b>Bryn Mawr</b>	<b><u>The Shipley School</u></b> <b><i>Zhang, Yihui (Elvis), 18</i></b> High-Efficient Capture and Purification of Air Pollutants via a Nanofibrous, Chemical Compositated, Biodegradable Filter
<b>Collegeville</b>	<b><u>Perkiomen Valley High School</u></b> <b><i>Yeiser, Aaron Joseph, 18</i></b> A Next Generation Partial Differential Equation Solver
<b>Kennett Square</b>	<b><u>Unionville High School</u></b> <b><i>Maheshwari, Sagar, 18</i></b> SiteKey: A Novel Binding Site Predictor for Ordered Proteins Interacting with Intrinsically Disordered Proteins
<b>Merion Station</b>	<b><u>Kohelet Yeshiva High School</u></b> <b><i>Goldman, Shai Tzvi, 17</i></b> Looking for Natural Memory Chunking Using Inter-Response Times
<b>Pittsburgh</b>	<b><u>Taylor Allderdice High School</u></b> <b><i>Hajlasz, Natalia, 16</i></b> Atomistic Simulation of Pathways for $Mg^{2+}$ – Water Dissociation with Rigorous Kinetics

## SOUTH CAROLINA

<b>Columbia</b>	<b><u>Spring Valley High School</u></b> <b><i>Marazzo, Luke B., 18</i></b> The Effect of Residing Near a Combined Coal Ash/Nuclear Waste Pond on Certain Cancers and Health Conditions in Hartsville, South Carolina
<b>North Charleston</b>	<b><u>Academic Magnet High School</u></b> <b><i>Dasgupta, Shaoni, 18</i></b> Individual Variability in Brain Response to Drug Cues predicts rTMS Efficacy

## SOUTH DAKOTA

<b>Brookings</b>	<b><u>Brookings High School</u></b> <b><i>Jin, Jenny, 17</i></b> Inhibitory Effects of Human Serum Albumin-conjugated Superoxide Dismutase Mimetic on Breast Cancer Cell Proliferation
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## TENNESSEE

<b>Nashville</b>	<b><u>Hume Fogg Academic High School</u></b> <b><i>Ashokan, Anagha, 17</i></b> POPDC3 Regulates Epithelial-Mesenchymal-Transition in Colorectal Cancer Cells
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## TEXAS

<b>Austin</b>	<b><u>Liberal Arts &amp; Science Academy</u></b> <b><i>Pusapaty, Sai Sameer, 17</i></b> Enhancing the Algal Biohydrogen Production Using Flue Gas Derived Bicarbonate and Nutrient Limitation Methods
<b>College Station</b>	<b><u>College Station High School</u></b> <b><i>Mukherjee, Merusha, 18</i></b> Strip PET Design: Test Cost Effective Scintillators and Data Acquisition Hardware



Denton	<b><u>John H. Guyer High School</u></b> <b><i>Shah, Abhishek, 16</i></b> The Effects of Glucose on the Behavior and Nervous System of <i>Caenorhabditis elegans</i>
	<b><u>Texas Academy of Mathematics and Science</u></b> <b><i>Ashok, Bhaargavi, 17</i></b> Identification of Genes Mutated in Cancer That Are Susceptible to Mitochondrial Damaging Drugs
	<b><i>Kalakuntla, Prateek Rao, 18</i></b> A Novel Luminescent Gold(I)-Based Hybrid System for Sensing Mercury
Fort Worth	<b><u>Harmony School of Innovation</u></b> <b><i>Khazi-Syed, Afeefah Fatimah, 17</i></b> Nano is Novel: Improving Antibiotic Efficacy for <i>S. epidermidis</i> with Structurally-Modified Silver Nanoparticles
	<b><u>Robert L. Paschal High School</u></b> <b><i>Iyer, Anand G., 17</i></b> 4 Body Spatially-Periodic 1D System
Houston	<b><u>Clear Lake High School</u></b> <b><i>Selva, Kavita, 17</i></b> From Nano Defects to Mega Power: Zirconium-doped Trapped Field (Gd,Y) BaCuO Superconductor Tapes for High Power Wind Turbine Generators
	<b><u>Cypress Falls High School</u></b> <b><i>Du, Michael, 18</i></b> Nifurtimox Limits Cell Proliferation in Glioblastoma Multiforme <i>in vitro</i>
Parker	<b><u>Magnolia Academy</u></b> <b><i>Elliott, Steven Thomas, 18</i></b> A Quadcopter Nonlinear Motor Controller Using Force Sensor Feedback
Plano	<b><u>Plano East Senior High School</u></b> <b><i>Iyer, Krithika, 17</i></b> Bayesian Knowledge Trace for Mind Theoretic Applications
	<b><u>Plano West Senior High School</u></b> <b><i>Du, Brian Jason, 18</i></b> Novel Inhibitors of Glucose Transporter 1 for Cancer
	<b><i>Gilmore, Claire Elizabeth, 18</i></b> Detection of the Extrasolar Planet WASP-33b Using Differential Photometry with Color Filter Analysis
Southlake	<b><i>Wojtania, Nicole Megan, 17</i></b> Optical Encryption with Cellulose Nanocrystals: Polymer and Amino Resin Cellulose Composites Decorated with Nanoparticles
	<b><u>Magnum Opus Home School</u></b> <b><i>LaDue, Magnus David, 17</i></b> The Cantor Game: Winning Strategies and Determinacy
Sugar Land	<b><u>William P. Clements High School</u></b> <b><i>Xu, Byron Lee, 17</i></b> Direct Determination of Ocean Temperature Profiles from Seismic Oceanography

## UTAH

Salt Lake City

### West High School

*Liu, Kathy, 18*

Nature-Based Solid Polymer Electrolytes for Improved Safety, Sustainability and Efficiency in High-Performance Rechargeable Batteries

## VIRGINIA

Alexandria

### Episcopal High School

*Lim, Hyun Jee, 18*

Crack Morphogenesis Induced by Drying Shrinkage

### Thomas Jefferson High School for Science and Technology

*Liu, Eric Justin, 18*

Examining Antibiotic Modulation of the Gut Microbiome and Mycobiome in Cirrhotics with Hepatic Encephalopathy

*Naidu, Prathik, 17*

DNALoopR: A Novel High-Performance Machine Learning Predictor to Identify Genome-Wide 3D DNA Interactions in Cancer

McLean

### Potomac School

*Holmes, Peter Augustus, 17*

Chloroplasts are as Efficient as Glucose in Ethanol Production by Yeast *Saccharomyces cerevisiae*

## WASHINGTON

Olympia

### Olympia High School

*Mundada, Surabhi Gopal, 17*

*MyHealth*: A Wearable Solution for Detection, Monitoring, and Control of Parkinsonian Tremors along with Assisting Impaired Hand Movements and Grip

Redmond

### Tesla STEM High School

*Khandelwal, Apoorv, 17*

Molecular Dynamics Simulation and Experimental Fabrication of Nanoporous Graphene Membranes for Optimal Water Permeability in Reverse Osmosis Desalination

Richland

### Hanford High School

*Bontha, Naveena Aishwarya, 17*

Fabricating High Capacity CO<sub>2</sub> Separation Membranes and Inexpensive Electrochromic Thin Films for the Mitigation of Global Warming

## WISCONSIN

Milwaukee

### University School of Milwaukee

*Fuad, Hajira, 17*

Computational Discovery of Pharmacological Chaperones to Rectify Protein Misfolding Using a Novel Support Vector Machine Classifier

## INDIA

Mumbai

### Aditya Birla World Academy

*Chowdhury, Shoumik, 17*

Comparing Weak and Projective Measurements for Single-qubit Quantum State Tomography

## SOUTH KOREA

Gyeonggi-do

**Seoul International School**

***Kim, Jaeha, 18***

Targeting Tumor and Tumor-Associated Vasculature with Stem Cells  
Secreting an Anti-Angiogenic and Pro-Apoptotic Fusion Protein Drug

## TAIWAN

Tienmou Taipei

**Taipei American School**

***Wan, Mitchell, 17***

The Role of Rab11 Proteins in Neuronal Development

Acks, Eitan .....	3	Farb, Beatrice .....	7	Jung, Bongseok .....	16
Agarwal, Aakshi .....	5	Fong, Andrew Kevin .....	12	Kalakuntla, Prateek .....	23
Allen, Alexander .....	20	Foo, Ryan Matthew .....	13	Kaneb, Andrew .....	10
Ang, Kai-Siang Matthew .....	4	Fu, Ruiwen .....	15	Kang, Anthony .....	2
Ashok, Bhaargavi .....	23	Fuad, Hajira .....	24	Kang, Ji Young .....	12
Ashokan, Anagha .....	22	Gallagher, Julia .....	6	Kannan, Gokul .....	9
Baral, Jessika .....	2	Ganesan, Anurudh .....	8	Kannan, Suganth .....	6
Bayley, Yasamin .....	13	Gao, Patrick .....	15	Karamchedu, Chaitanya .....	21
Bingham, Beau .....	21	Geller, Jared Matthew .....	6	Katz, Andrew .....	16
Blomquist, Viggo .....	10	Gershengorin, Nathan .....	17	Kehoe, Webster .....	18
Bloomfield, Rebecca .....	4	Gibbons, Aidan .....	13	Kelly, Claire .....	13
Bontha, Naveena .....	24	Gilja, Riya .....	16	Kendall, Isabel .....	10
Canarick, Adam .....	19	Gilmore, Claire .....	23	Kern, Garret .....	10
Catalano, Michael .....	16	Gjerswold-Selleck, Sabrina .....	12	Khandelwal, Apoorv .....	24
Chang, Annette .....	2	Goldman, Shai .....	22	Khazi-Syed, Afeefah .....	23
Chang, Kevin .....	3	Gopalakrishnan, Vivek .....	10	Khoo, Celine .....	17
Chao, Sichen .....	11	Gormley, Caitlin .....	20	Kim, Angela .....	4
Chattopadhyay, Aurnov .....	2	Greco, Isabella .....	13	Kim, Daniel .....	14
Chattopadhyay, Sambuddha .....	9	Guo, DeeAnn .....	14	Kim, Jaeha .....	25
Cheerla, Nikhil .....	1	Guo, Nicholas .....	3	Kim, Janie .....	3
Cheleden, Spencer .....	4	Guo, Raymond .....	10	Kim, Justin .....	15
Chen, Alan .....	16	Hajlasz, Natalia .....	22	Kim, Yena .....	19
Chen, Benjamin .....	1	Hallisey, Olivia .....	5	Kirov, Alexander .....	7
Chen, David .....	1	Han, Edward .....	3	Ko, Matthew .....	15
Chen, Ethan .....	9	Han, Eric .....	2	Koch, Christopher .....	19
Chen, Richard .....	9	Handler, Katherine .....	5	Koe, Nora .....	17
Cho, Kathleen .....	9	Hase-Liu, Matthew .....	3	Kogan, Maria .....	18
Chong, Isabelle .....	13	He, James .....	5	Komosa, Reid .....	18
Chowdhury, Shoumik .....	24	Herndon, Liam .....	17	Kucher, Phillip .....	17
Chung, Jonathan .....	16	Hlaing, Lynn .....	15	Kumar, Vishrath .....	19
Clyburn, Anna .....	20	Holmes, Peter .....	24	LaDue, Magnus .....	23
Cohen, Alexander .....	17	Hong, Jerry .....	2	Laffan, Claire .....	20
Cooper, Jordan .....	14	Hord, Blake .....	14	Lane, Graham .....	21
Crook, James .....	17	Howarth, Madeline .....	21	Langone, Dylan .....	18
Cuomo, Abbigayle .....	14	Hu, Alexander .....	18	Lee, Bryan .....	21
Daley, John .....	10	Hu, Grace .....	15	Lee, Daniel .....	12
D'Alonzo, Samantha .....	18	Hu, Serina .....	17	Lee, Jiwoo .....	12
Dalvi, Rohan .....	9	Huang, Irwin .....	14	Lee, Michael .....	16
Dardet, Matthew .....	6	Huang, Kevin .....	9	Lee, Nathaniel .....	15
Das, Indrani .....	12	Huo, Lily .....	20	Lee, Truelian .....	5
Dasgupta, Shaoni .....	22	Hyslop, Jack .....	12	Leng, Alec .....	21
Deng, Angela .....	20	Iyer, Anand .....	23	Levy, Maya .....	6
Devraj, Nikhil .....	13	Iyer, Dhruv .....	1	Li, Dexin .....	19
Dhawan, Arjun K. ....	8	Iyer, Krithika .....	23	Li, Dory .....	20
Do, Dawson .....	10	Jakhete, Shantanu .....	6	Li, Dylan .....	17
Du, Brian Jason .....	23	Jenkins, Lily .....	7	Li, Eric .....	2
Du, Michael .....	23	Jiang, Enoch .....	11	Li, Mingyu .....	14
Edupuganti, Vineet .....	21	Jiang, Kelly .....	21	Li, Sandra .....	15
Ehrenstein, Samuel .....	10	Jin, Jenny .....	22	Li, Sophia .....	2
Elliott, Steven .....	23	Joseph, Alby .....	20	Li, Tingyu .....	9
Fang, Jacy .....	12	Jozwik, Rachel .....	17	Lim, Hyun Jee .....	24

Lin, Caroline Miyake .....	17	Rakhimov, Jennifer .....	13	Verma, Archana .....	16
Lin, Sharon .....	17	Ramani, Arjun .....	8	Verma, Neha .....	7
Lindsay, Christopher .....	7	Ravishanker, Pravin .....	3	Wan, Mitchell .....	25
Liu, Albert .....	14	Rekhtman, David .....	8	Wan, Stefan .....	6
Liu, Eric .....	24	Rhee, Ben .....	19	Wang, Allison .....	8
Liu, Kathy .....	24	Rizvon, Alia .....	14	Wang, Felix .....	10
Loop, McKenna .....	1	Rohatgi, Dhruv .....	11	Wang, Jenica .....	2
Lu, Nancy .....	17	Rozental, Stefano .....	19	Wang, Jennifer .....	7
Lundelius, Olivia .....	15	Sakhrani, Neeraj .....	13	Wang, Melissa .....	21
Lu-Yang, Juliana .....	10	Salegame, Rajath .....	7	Wang, Michael .....	8
Madan, Vrinda .....	6	Saltzman, Audrey .....	13	Wang, Richard .....	9
Maheshwari, Sagar .....	22	Saluja, Sajeev .....	1	Wang, Zhitong .....	16
Malfa, Ana Claire .....	18	Samantaray, Yash .....	19	Waung, Isabella .....	12
Mallidi, Ajitha .....	21	Sang, Brian .....	16	Weaver, Jackson .....	12
Marazzo, Luke .....	22	Sankar, Venkat .....	4	Wellman, Julian .....	11
Marda, Nikhil .....	11	Sathish, Sanjeev-Kumar .....	5	Westendorff, Karl .....	20
Mathew, Vincy .....	18	Saxena, Aakanksha .....	1	Wexler, Jocelyn .....	19
McDonald, Sydney .....	8	Scanteianu, Adriana .....	18	Winter, Allison .....	18
Mehta, Rushabh .....	19	Seidman, Lauren .....	18	Wojtania, Nicole .....	23
Mehta, Setu .....	17	Selva, Kavita .....	23	Woo, Derek .....	5
Merk, Liana .....	3	Selvamurugan, Shanmurugan .....	3	Worsley, Mark .....	16
Minke, Amanda .....	1	Shah, Abhishek .....	23	Wu, Anton .....	14
Morse, Nathan .....	18	Shah, Manan .....	4	Xia, Brian .....	3
Mudholkar, Jay .....	5	Shah, Nirja .....	6	Xiao, Katherine .....	4
Mukherjee, Merusha .....	22	Shah, Shalin .....	2	Xu, Byron .....	23
Mundada, Surabhi .....	24	Siddiqui, Omer .....	11	Xu, Frederick .....	9
Mundra, Ishan .....	9	Singer, Lauren .....	19	Yamaguchi, Evan .....	9
Murthy, Veda .....	10	Sinha, Nishita .....	11	Yang, Amber .....	6
Nachman, Michael .....	18	Sivakumar, Pranav .....	7	Yang, Jason .....	8
Nadelmann, Julia .....	5	Smith, Rubin .....	15	Yang, Michael .....	20
Naidu, Prathik .....	24	Solt, Zoe .....	21	Yatvitskiy, Jacob .....	12
Nandwani, Anjeli .....	6	Song, Scott .....	4	Yeiser, Aaron .....	22
Nath, Kirti .....	14	Sridhar, Arvind .....	3	Yue, Albert .....	10
Nemeth, Erika .....	19	Sridhar, Varsha .....	1	Zaminski, Devyn .....	5
Nirmel, Sandip .....	4	Srinivasan, Swathi .....	20	Zakoworotny, Michael .....	14
Novek, Ethan .....	5	Stefanakis, George .....	13	Zeng, Catherine .....	2
Pahlavan, Adam .....	15	Sternbach, Michael .....	13	Zhang, Amy .....	8
Paladugu, Praharshasai .....	8	Su, Yujia .....	15	Zhang, Jaysen .....	15
Pandey, Shivani .....	9	Subramaniam, Arjun .....	4	Zhang, Marilyn .....	4
Paskov, Alexander .....	19	Subramaniam, Varun .....	12	Zhang, Rachel .....	11
Peng, Felix .....	7	Sun, Alec .....	11	Zhang, Tyrone .....	13
Perkins, Matthew .....	15	Sweeney, Connor .....	6	Zhang, Yihui (Elvis) .....	22
Peterson, Emily .....	19	Talapaneni, Suresh .....	1	Zhong, Ruisi .....	19
Pierson, Laura .....	2	Tan, Natalie .....	17	Zhou, Madeleine .....	5
Ping, Christina .....	12	Tangella, Kavya .....	14	Zhu, Justin .....	1
Porras, Melanie .....	16	Tian, Jessica .....	3	Zhu, Mary .....	11
Pusapaty, Sai .....	22	Tkachenko, Nestor .....	14	Zhu, Shelley .....	20
Pyda, Srivatsav .....	4	Upadhyayula, Pranav .....	7		
Rabb, Neil .....	9	Uzsoy, Ana .....	20		
Radiya-Dixit, Evani .....	4	Van Roy, Parker .....	16		
Rajamani, Geetanjali .....	11	Venkatakrishnan, Mukund .....	8		



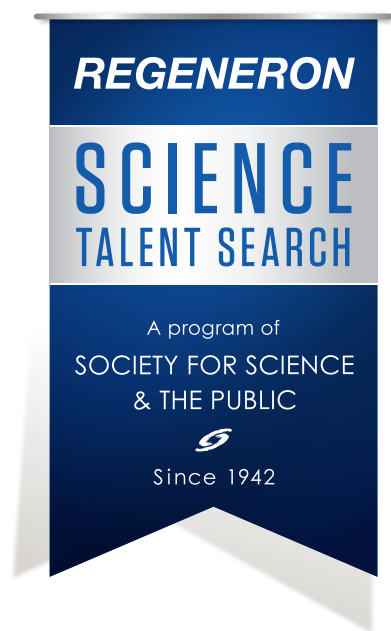




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