

# SCIENCE OLYMPIAD 2022 **NATIONAL** **TOURNAMENT**

CALIFORNIA INSTITUTE OF TECHNOLOGY

MAY  
9-18  
2022



A Year of  
**IMAGINATION**

*Presented in Partnership with Caltech*



**Caltech**



# STEAM:CODERS

## TOGETHER WE CAN PROVIDE OPPORTUNITY

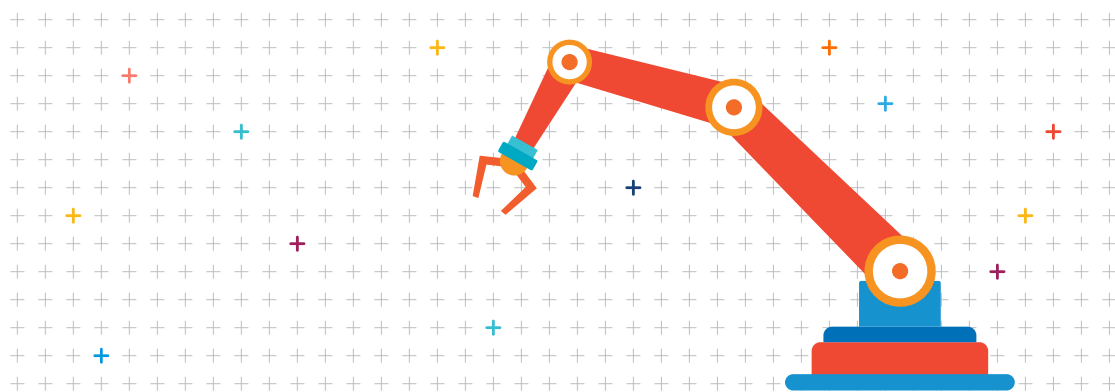
As a gesture of gratitude to the city that would have hosted our in-person 2022 Science Olympiad National Tournament, Science Olympiad and Caltech are partnering with STEAM:CODERS to raise funds for this Los Angeles-area nonprofit that teaches logic, critical thinking and problem solving to underserved students. From April 10 to May 14, 2022, Science Olympiad teams, coaches, parents, officials, sponsors and volunteers are invited to donate any amount. A goal of \$10,000 has been set, and a generous \$10,000 matching donation has been secured! Let's show our Science Olympiad spirit to those in need. **It's Good to Be Smart, and Smart to Be Good!** Donations can be made at:

<https://steam-coders.networkforgood.com/projects/155119-science-olympiad-caltech>



# TABLE OF

# CONTENTS



## **01-08** WELCOMES

### **10** 2022 TOURNAMENT COMMITTEE LEADS

### **11** TOURNAMENT WEEK SCHEDULE

### **12** OPENING CEREMONY KEYNOTE SPEAKER

### **13** OPENING AND AWARDS CEREMONY SCHEDULES

### **14** PLEDGES

### **16-20** EVENT DESCRIPTIONS

### **21-24** PARTICIPATING SCHOOLS

### **25-26** TOURNAMENT DAY SCHEDULE

### **27** GLOBAL AMBASSADOR TEAM

### **29-32** STATE DIRECTORS AND EVENT SUPERVISORS

### **33-34** NATIONAL EXECUTIVE BOARD & COMMITTEES

### **35-37** NATIONAL PROGRAM SPONSORS

# WELCOME from the NATIONAL SCIENCE OLYMPIAD



On behalf of the Science Olympiad Executive Board and Advisory Committee, our staff, State Directors and Supervisors, I'd like to welcome you to the **38th Annual Science Olympiad National Tournament** presented in partnership with Caltech, a world-renowned science and engineering institute.

The theme of this year's Science Olympiad National Tournament is **Imagination**, which perfectly captures the spirit of invention and creativity in Caltech's home state of California. From advances at NASA's Jet Propulsion Laboratory to Nobel Prize-winning research at Caltech to dazzling entertainment streaming out of Hollywood, imagination is in the air.

That same spirit of imagination infused this year's tournament season, informing the designs of your bridges, vehicles, planes and devices and driving your thirst for knowledge and understanding of the scientific world. I know that solutions for many of the problems we face – from eradicating disease, to providing clean energy, to feeding the hungry – will be solved by Science Olympiad alums, and many of you reading this today.

I know we're not supposed to play favorites, but I think our Science Olympiad students represent the best of the best. Not only are our participants academically talented, but they also bring the 3C's of Science Olympiad to life, exemplifying character and citizenship in the community by founding charities, starting mentoring programs and performing college-level medical research. The positivity and commitment to serving others gives me great hope for this next generation of leaders and STEM stars.

While this year was another one for the books – testing our resolve, our resilience and our spirit – together, we made it work, and here we are, at the apex, the 2022 Science Olympiad National Tournament! Now it's time to show the world what it means to be a champion. Best of luck to all!

**Jenny Kopach**  
CEO  
Science Olympiad





# WELCOME from CALTECH



California Institute of Technology  
Pasadena, CA 91125 | [tfr@caltech.edu](mailto:tfr@caltech.edu) | (626) 395-6301

Thomas F. Rosenbaum, *President*  
*Sonja and William Davidow Presidential Chair and Professor of Physics*



May 13, 2022

Dear Participants:

Welcome to Caltech, and congratulations on qualifying for the 2022 Science Olympiad National Tournament. It is an honor to host some of the world's most talented and enthusiastic students and watch you navigate this week's challenging events.

Every day, we see the importance of science and engineering in revealing the mysteries of the universe and in improving people's lives. Pressing challenges from clean energy to global health to climate change depend on translating our understanding of the fundamental science into innovative new technologies.

At the heart of these achievements is the love of discovery, from illuminating the realm of subatomic particles to detecting colliding black holes. Only with imagination can we develop the new ideas that have the potential to change the world.

Since its founding, Caltech has welcomed and sought the most imaginative thinkers. The Institute has nurtured leading scholars, giving rise to accomplishments such as the detection of gravitational waves, the directed evolution of enzymes, the mitigation of air pollution, and the analysis of chemical reactions within quadrillionths of a second. Caltech scholars are responsible for the creation of the Jet Propulsion Laboratory (JPL), which successfully launched America's first satellite, landed the first spacecraft on Mars, and flew the first helicopter on another planet. Collectively, Caltech scholars have earned 46 Nobel Prizes, 17 Wolf Prizes, and 42 MacArthur "Genius" Awards, to name a few.

As you embark on your journey, may you find inspiration from your time here on the Caltech campus. Your scientific imaginations will change the world for the better. We thank you for enriching our community with your energy, curiosity, and big ideas.

Enjoy the tournament!

Sincerely,

**Caltech**

Thomas F. Rosenbaum



WELCOME

# WELCOME from the NATIONAL TOURNAMENT DIRECTORS



Welcome to the 2022 Science Olympiad National Tournament, hosted jointly by Caltech and Southern California Science Olympiad. The team here could not be more excited to invite you virtually to our home in Pasadena, CA. Located just beyond the sunny beaches and the glamour and glow of Hollywood, Caltech has been the home of imagination for more than a century. At the forefront of science, technology, engineering, and math, Caltech has earned the most Nobel prizes per capita, and continues to produce world-class research through the hard work of its 3,000 students, staff, and faculty.

The fundamental questions you all encounter in your various events are no different than those that we at Caltech seek to answer every day. It is therefore fitting that Caltech plays an essential role in Science Olympiad, running various Southern California Regional tournaments, hosting the Southern California State Tournament since 2006, and now, for the first time, hosting the National Tournament.



As with any major effort, the 2022 Science Olympiad National Tournament is only possible through the hard work of hundreds of volunteers from Caltech and our partner universities, as well as alumni throughout Southern California and across the nation. Everything from exam questions to video production to merchandise was the result of the amazing team we've built over the years. This tournament serves as a testament to their character and collaborative spirit, just a couple of Caltech's defining qualities.

Closer to home, the Caltech administration and staff, the Scilympiad team, as well as our generous sponsors have supported us for many years as we strove to bring Science Olympiad to students of all backgrounds. We would also like to acknowledge the time that the coaches and parents put in to get the students to where they are today.



Regardless of your outcome at this year's Nationals, know that you all are leaders in science. Just participating in Science Olympiad is a symbol of your dedication and perseverance. It ensures that you, as part of the next generation of scientists and leaders, will have the foundation needed to tackle the challenges of tomorrow. From all of us at Caltech and Southern California Science Olympiad, congratulations on your success and good luck at the upcoming competition! We hope our tournament invigorates your love for science and inspires you to join us in pushing the boundaries of knowledge.

**Peter, Jolly, and Albert**

Co-Directors of the National Tournament



Caltech

EXPLORING THE

# Solar System

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WELCOME from

# CONGRESSMAN ADAM SCHIFF



**ADAM B. SCHIFF**

Member of Congress  
California's 28th District



May 13, 2022

Dear Friends:

It is my great pleasure to welcome you to the 2022 National Science Olympiad National Tournament.

For well over three decades, the Science Olympiad, a remarkable science, technology, engineering and math (STEM) organization, has been a positive influence and inspiration to hundreds of thousands of students across the entire nation to study and pursue careers in a STEM field. This year, Science Olympiad's national tournament will be co-hosted by the world-renowned California Institute of Technology (Caltech) and the theme, Imagination, perfectly encapsulates the incomparable creativity and ingenuity found on the campus of Caltech.

In this globalized and digital age, STEM education and a STEM-trained workforce are needed more than ever, and to that end, I commend Caltech and Science Olympiad for fostering and providing outstanding opportunity to our nation's STEM students with the 2022 national tournament.

My best wishes to all for a successful tournament!

Sincerely,

**ADAM B. SCHIFF**  
Member of Congress



# WELCOME from CONGRESSWOMAN JUDY CHU

**JUDY CHU, Ph.D.**  
27<sup>TH</sup> DISTRICT, CALIFORNIA  
**COMMITTEE ON  
WAYS AND MEANS**  
SUBCOMMITTEE ON  
HEALTH  
SUBCOMMITTEE ON  
HUMAN RESOURCES  
**COMMITTEE ON  
SMALL BUSINESS**  
SUBCOMMITTEE ON  
ECONOMIC GROWTH, TAX AND CAPITAL ACCESS



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May 13, 2022

Caltech  
Pasadena, CA 91125



Dear National Science Olympiad participants,

It is with great pleasure that I welcome you on behalf of California's 27<sup>th</sup> Congressional District to the 38<sup>th</sup> Annual Science Olympiad National Tournament proudly hosted by Science Olympiad and Caltech.

The COVID-19 pandemic highlighted the increasing importance of a STEM education. During a time when we were forced to physically distance from one another, technology kept us all connected through virtual meetings, social media, and other vital platforms. As we make our way out of the pandemic, there remain many problems that face our world and STEM gives us the tools to tackle monumental challenges like climate change, infectious diseases, income inequalities and much more. A STEM education is now more important than ever, and the powerful skills our youth gain in these fields will ensure that our nation remains at the forefront of progress and technological advancements.

The Science Olympiad National Tournament represents the highest level of achievement for the country's best Science Olympiad teams. I also want to welcome the Global Ambassador Team from Japan, representing more than 2,00 students. I applaud you all on your advanced skill and devotion to scientific achievement and innovation, as well as how we can all become responsible global citizens.

On behalf of the United States House of Representatives and the people of the 27<sup>th</sup> Congressional District, I offer my congratulations and best wishes for the success of your research and future endeavors.

Sincerely,

**JUDY CHU, Ph.D.**  
Member of Congress, 27<sup>th</sup> District



WELCOME

# WELCOME from **MAYOR VICTOR GORDO**



## OFFICE OF THE MAYOR

May 13, 2022

Dear Friends and Supporters  
of the Science Olympiad National Tournament:

On behalf of the City Council, I extend a cordial welcome as you virtually gather to enjoy the 38th Annual Science Olympiad National Tournament, and extend best wishes for an enjoyable and successful event.

Founded in 1984, Science Olympiad is one of the premier science competitions in the nation, providing standards-based challenges to nearly 5,000 teams at 375 live and remote tournaments in all 50 states last year. The Science Olympiad National Tournament is the pinnacle of achievement for 120 of the country's best Science Olympiad teams and the Global Ambassador Team from Japan, representing more than 2,000 students.

This year's theme, *Imagination*, captures the spirit of invention and creativity in Caltech's hometown of Pasadena. From NASA's Jet Propulsion Laboratory's Rover on Mars to the innovative research at Caltech, imagination is in the air. Together, Science Olympiad and Caltech will inspire the next generation of STEM superstars, makers and explorers.

I am pleased to extend congratulations to all who participate in Tournament Week, the STEM Expo, and competition day. Keep up the great work!

Sincerely,

  
VICTOR M. GORDO  
Mayor

100 North Garfield Avenue • Pasadena, CA 91109  
(626) 744-4311 Fax (626) 744-3921



# WELCOME from STATE SENATOR ANTHONY PORTANTINO

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GOVERNMENTAL ORGANIZATION  
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SELECT COMMITTEES  
CALIFORNIA, ARMENIA & ARTSAKH  
MUTUAL TRADE, ART, AND  
CULTURAL EXCHANGE  
CHAIR

May 13, 2022

California Institute of Technology  
1200 E California Blvd.  
Pasadena, CA 91125

Dear Friends,

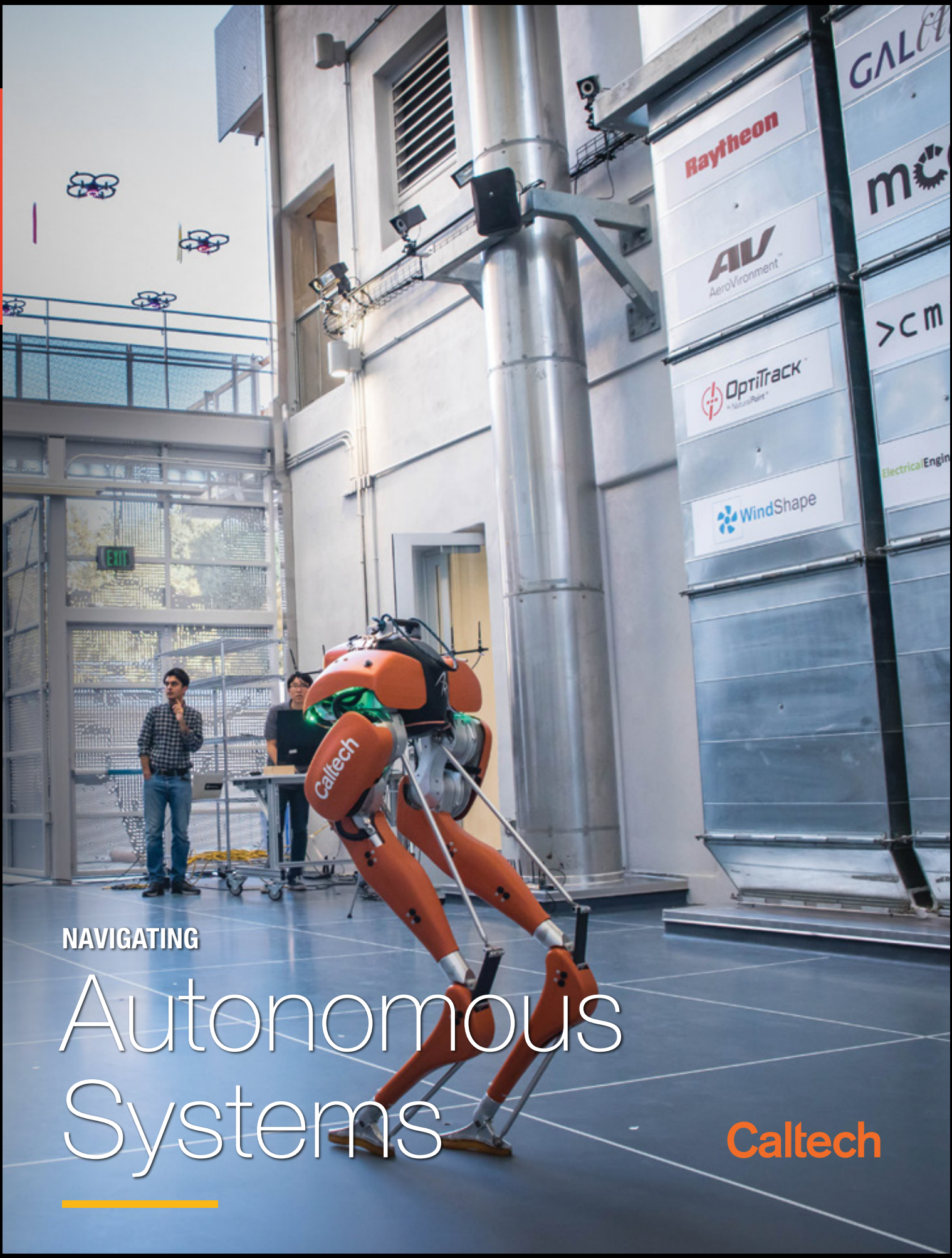
I am happy to welcome young scientists from across the country to the 38<sup>th</sup> Annual Science Olympiad National Tournament. This year's theme, *Imagination*, serves to inspire the next generation of explorers to use creative thinking to discover unknown worlds as well as solve the problems we face here on our own planet. I am inspired by the curiosity of our youth and the spirit of innovation that is in the hearts of the more than 2,000 competitors this week.

The California Institute of Technology has made Pasadena a central hub of global scientific research for over 130 years. Caltech is home to some of the most brilliant scholars and researchers in their fields, and I am proud to represent this outstanding institution and support its groundbreaking research efforts. I admire the dedication Caltech has to encouraging young people's interest in science and showing that they are limited only by their own dreams.

I send my deepest gratitude to the organizers of this event for their hard work to make this week safe and enjoyable for its participants. I wish the best of luck to all students competing in this year's Science Olympiad National Tournament.

Sincerely,

Hon. Anthony J. Portantino  
Senator, 25<sup>th</sup> District



NAVIGATING

# Autonomous Systems

Caltech



# THE 2022 TOURNAMENT COMMITTEE LEADS



## Peter Hung

Southern California State Director, National Tournament Co-Director

Dr. Peter Hung is a Project Leader at The Aerospace Corporation, a Federally Funded Research and Development Center. He received his B.S. in Physics and M.S. and Ph.D. in Applied Physics from Caltech. As a Science Olympiad alum, Peter started Caltech's involvement with Science Olympiad and later founded the Caltech Science Olympiad Club to provide opportunities for Science Olympiad alumni to give back to Science Olympiad. Though his favorite event in high school was Mission Possible, he was responsible for the creation of events like Gravity Vehicle, Robot Arm, Mousetrap Out and Back and has started the development of new events like Write It CAD It, Digital Structures, and Cybersecurity. He currently serves as the Southern California Science Olympiad State Director and the Bay Area Science Olympiad Regional Director. In 2009, he received the Science Olympiad Heart of Gold Award and served on the National Science Olympiad Advisory Committee from 2017 until 2019, when he started serving on the National Science Olympiad Executive Board. Outside of Science Olympiad, he also serves on the board of several other nonprofits to promote and improve undergraduate research at Caltech and in Southern California. He enjoys tending to his orchids and watching space launches in his spare time.



## Jolly Patro

National Tournament Co-Director

Jolly Patro is a current junior studying Chemistry from Blacker House at Caltech. Her involvement with Science Olympiad started in 2015 when she joined Olathe North High School's Science Olympiad Team. In her time as a competitor, she and her team qualified for the Kansas State tournament for four years and once to the National Tournament. Some of Jolly's favorite events are Chemistry Lab, Sounds of Music, and Thermodynamics. She encourages competitors to try events that are different from each other because they may find interest in something that they would have never considered before! Since starting at Caltech, she joined the Caltech Science Olympiad Club and currently serves as its Co-President as well as the National Tournament Co-Director for this year. At Caltech, Jolly also serves as the Co-Secretary of Blacker House, Co-Secretary of the Board of Control, Vice-President of the Chemistry Club, an Ambassador of the Student-Faculty Programs, and a member of the Caltech Orchestra and Chamber Programs. Outside of school and activities, Jolly loves to bake and is always looking for more fun recipes!



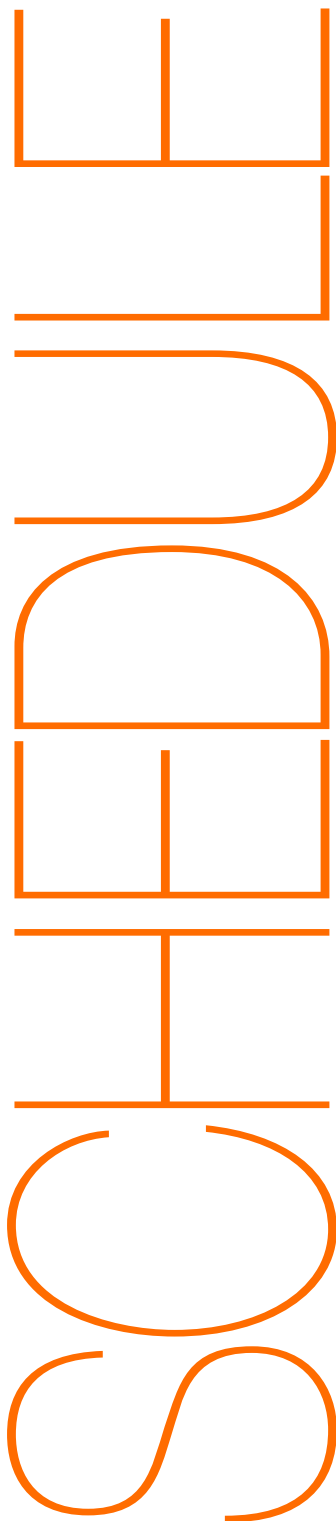
## Albert Kyi

National Tournament Co-Director

Albert Kyi is a current junior studying Chemical Engineering, with a focus in sustainability, from Avery House at Caltech. He currently serves as Co-President of the Caltech Science Olympiad Club and Co-Director for this year's National Tournament. His Science Olympiad competition days began nearly a decade ago, in his sixth grade. When he moved to a new middle school in seventh grade, he took his passion for STEM and started a new Science Olympiad team there. This same passion led him to start yet another Science Olympiad team at his high school. He considers Forensics and Thermodynamics his favorite events and wants to remind competitors to avoid using metal spatulas for flame tests in Forensics, a lesson he learned the painful way. He's proud to be able to contribute to all levels of Science Olympiad tournaments and hopes his leadership will serve as an inspiration to those coming after him. On campus, Albert also serves as the VP of Internal Affairs for the Caltech Y, an on-campus community service and advocacy organization, as well as Secretary of the Caltech Chapter of the American Institute of Chemical Engineers (AIChE). He is also the Head Peer Advocate and Head Health Advocate for Avery House. He enjoys biking and playing volleyball in his free time, and is excited by urban planning and negative carbon emissions technologies. As a proud New Yorker, he will also take anyone up on a slice of Junior's cheesecake or a sandwich at Katz's.

# MAY 09 -18

## TOURNAMENT WEEK



9

### MONDAY

- » **Panel Discussion:** Admissions Discussion with Caltech Students
- » **Video:** Virtual Campus Tour of Caltech

10

### TUESDAY

- » **Discussion:** Meet Raymond Ealy of STEAM:CODERS and our joint "Smart to Be Good" fundraiser
- » **Video:** A Look Into Caltech Research Programs
- » **Hands On Activity:** "Chess is STEM" webinar with ChessKid

11

### WEDNESDAY

- » **EXPO Talks:**
  - "From SciOly Astronomy to Real Photos of Exoplanets" with Briley Lewis, UCLA PhD Candidate in Astronomy
  - "The Future of Dermatology Research" with Ernest Lee, MD, PhD, physician scientist
  - "From Bioinformatics to Machine Learning" with David Fan, applied research scientist
- » **Video:** Finding a Home in College Through Science Olympiad
- » **Video:** CDC NERD Academy Session

12

### THURSDAY

- » **EXPO Talks:**
  - "Engineering Antibodies to Target Disease" with Phil Liu, Stanford PhD Candidate in Biophysics
  - "Science in Hiding: Finding science in the kitchen and on the stage" with Jeffrey Rubel, edtech strategy director and historian of science
  - "Bringing Computer Science to All" with Leigh Ann DeLyser, PhD, executive director of CSforAll
- » **Video:** Learn about Caltech's innovations in robotics

13

### FRIDAY

- » **Opening Ceremony**

14

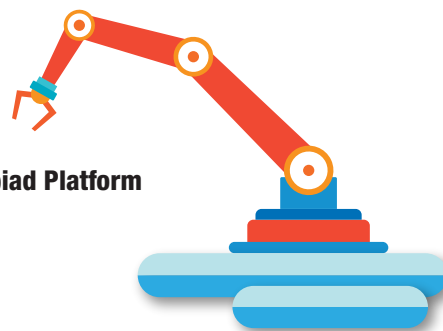
### SATURDAY

- » **Online Competition on Scilympiad Platform**

18

### WEDNESDAY

- » **Awards Ceremony**





# KEYNOTE SPEAKER

## DR. FRANCES ARNOLD

Linus Pauling Professor  
of Chemical Engineering,  
Bioengineering, and  
Biochemistry at the  
California Institute of  
Technology

Frances Arnold became the first American woman to win the Nobel Prize in Chemistry in 2018, and in 2019 was the first and only woman to make a cameo appearance on *The Big Bang Theory*. She still has a SAG-AFTRA contract to play herself, but unfortunately the beloved TV show is over, after 12 seasons. She still has a job, however, as the Linus Pauling Professor of Chemical Engineering, Bioengineering, and Biochemistry at the California Institute of Technology, where her group develops and uses directed evolution to create new DNA-encoded chemistry for applications in sustainable fuels and chemicals, agriculture, medicine and materials. She was awarded the National Medal of Technology and Innovation by President Obama in 2011 and was appointed co-Chair of the President's Council of Advisors on Science and Technology by Joe Biden in 2021. She earned a BS degree in Mechanical and Aerospace Engineering and a PhD in Chemical Engineering.

# OPENING CEREMONY

**FRIDAY  
MAY 13, 2022**

**5pm PT**



- » Welcome Remarks from Jenny Kopach, Science Olympiad CEO
- » Welcome from Caltech President Thomas Rosenbaum
- » Welcome from The Aerospace Corporation CEO Steven Isakowitz
- » National Anthem
- » Parade of States Video
- » Affirmation of Code of Ethics and Pledges
- » Japan Global Ambassador Team Welcome
- » Keynote Speech from Nobel Prize Winner Dr. Frances Arnold
- » Announcement of \$50,000 Founders' Scholarships

- » Welcome Remarks from Jenny Kopach, Science Olympiad CEO
- » Sponsor and Partner Gratitude
- » Thanks to the Japan Global Ambassador Team
- » Science Olympiad Spirit Awards
- » Announcement of the Winners of the 2022 Science Olympiad National Tournament
- » Welcome from the 2023 Science Olympiad Tournament Host, Wichita State University



# AWARDS CEREMONY

**WEDNESDAY  
MAY 18, 2022**

**5pm PT**

## CODE OF ETHICS

Student participants are expected to compete in tournament events with honest effort to follow the rules and the spirit of the competition. Team members are expected to be the builders of all the devices used in the events. The goal of competition is to give one's best effort while displaying honesty, integrity, and sportsmanship. Failure to show honesty and/or courtesy by a participant, coach or guest of the team may result in the disqualification of the team from that event, the entire tournament or future tournaments.

## STUDENT'S PLEDGE

I pledge to put forth my best effort in the Science Olympiad tournament and to uphold the principles of honest competition. In my events, I will compete with integrity, respect, and sportsmanship towards my fellow competitors. I will display courtesy towards Event Supervisors and Tournament Personnel. My actions will exemplify the proud spirit of my school, team, and state.

## COACH'S PLEDGE

On behalf of the coaches and assistants at this tournament, I pledge to encourage honesty and respect for tournament personnel, our fellow coaches, and other team members. We want our efforts to bring honor to our community and school.

## PARENT'S PLEDGE

On behalf of the parents and spectators I pledge to be an example for our children by:

- » Respecting the rules of Science Olympiad
- » Encouraging excellence in preparation and investigation
- » Supporting independence in design and production of all competition devices
- » Respecting the decisions of event supervisors and judges.

Our examples will promote the spirit of cooperation within and among all our participating teams.

## EVENT SUPERVISOR'S PLEDGE

On behalf of my fellow supervisors and tournament personnel, I pledge to run my event with fairness and respect for the participants and their coaches. Our actions will reflect the principles of the Science Olympiad program and display the pride we feel as representatives of our colleges, universities, companies, states or organizations.



Caltech

FORGING

# New Paths

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# 2022 NATIONAL EVENTS

## DIVISION B



ANATOMY & PHYSIOLOGY



BIO PROCESS LAB



BRIDGE



CODEBUSTERS



CRAVE THE WAVE



CRIME BUSTERS



DISEASE DETECTIVES



DYNAMIC PLANET



ELECTRIC WRIGHT STUFF



EXPERIMENTAL DESIGN



FOOD SCIENCE



GREEN GENERATION



METEOROLOGY



MISSION POSSIBLE



MOUSETRAP VEHICLE



ORNITHOLOGY



PING PONG PARACHUTE



ROAD SCHOLAR



ROCKS & MINERALS



SOLAR SYSTEM



SOUNDS OF MUSIC



STORM THE CASTLE



WRITE IT DO IT



BOTANY (TRIAL)



DIGITAL STRUCTURES (TRIAL)



WRITE IT CAD IT (TRIAL)

## DIVISION C



ANATOMY & PHYSIOLOGY



ASTRONOMY



BRIDGE



CELL BIOLOGY



CHEMISTRY LAB



CODEBUSTERS



DETECTOR BUILDING



DISEASE DETECTIVES



DYNAMIC PLANET



ENVIRONMENTAL CHEMISTRY



EXPERIMENTAL DESIGN



FORENSICS



GRAVITY VEHICLE



GREEN GENERATION



IT'S ABOUT TIME



ORNITHOLOGY



PING PONG PARACHUTE



REMOTE SENSING



ROCKS & MINERALS



TRAJECTORY



WIFI LAB



WRIGHT STUFF



WRITE IT DO IT



BOTANY (TRIAL)



CYBERSECURITY (TRIAL)



DIGITAL STRUCTURES (TRIAL)



WRITE IT CAD IT (TRIAL)

# DIVISION B EVENT DESCRIPTIONS

## COMPETITION EVENTS

**Anatomy & Physiology** – Participants will be assessed on their understanding of the anatomy and physiology for the human Nervous, Sense Organs, and Endocrine systems.

**Bio Process Lab** – This event is a lab-oriented competition involving the fundamental science processes of a middle school life science/biology lab program.

**Bridge** – Teams will design and build a Bridge (Structure) meeting requirements specified in these rules to achieve the highest structural efficiency.

**Codebusters** – Teams will cryptanalyze and decode encrypted messages using cryptanalysis techniques for historical and modern advanced ciphers.

**Crave the Wave** – In this event competitors must demonstrate knowledge and process skills needed to solve problems and answer questions regarding all types of waves and wave motion.

**Crime Busters** – Given a scenario, a collection of evidence, and possible suspects, students will perform a series of tests. The test results along with other evidence will be used to solve a crime.

**Disease Detectives** – Participants will use their investigative skills in the scientific study of disease, inquiry, health, and disability in populations or groups of people.

**Dynamic Planet** – Students will use process skills to complete tasks related to Earth's fresh waters.

**Electric Wright Stuff** – Prior to the tournament teams design, construct, and test free flight electric-powered monoplanes to achieve maximum time aloft.

**Experimental Design** – This event will determine the participant's ability to design, conduct, and report the findings of an experiment entirely on-site.

**Food Science** – Students will answer questions on food chemistry with a focus on sugars. In addition, participants will build a hydrometer capable of measuring sugar solutions between 1-10% (mass/volume).

**Green Generation** – Students will demonstrate an understanding of general ecological principles, the history and consequences of human impact on our environment, solutions to reversing trends and sustainability concepts.

**Meteorology** – Participants will use scientific process skills and quantitative analysis to demonstrate an understanding of the factors that influence world climate and climate change through the interpretation of climatological data, graphs, charts and images.

**Mission Possible** – Prior to the competition, participants design, build, test and document a Rube Goldberg-like device that completes required Start and Final Actions through a series of specific actions.

**Mousetrap Vehicle** – Teams design, build and test one vehicle using one or two mousetrap(s) as its sole means of propulsion to reach a target as quickly and accurately as possible.

**Ornithology** – Participants will be assessed on their knowledge of North American birds.

**Ping Pong Parachute** – Prior to the tournament, teams will design, build and bring up to three bottle rockets to the tournament to launch a ping pong ball attached to a parachute to stay aloft for the greatest amount of time.

**Road Scholar** – Participants will answer interpretative questions that may use one or more state highway maps, USGS topographic maps, Internet-generated maps, a road atlas, or satellite/aerial images.

**Rocks & Minerals** – Teams will demonstrate their knowledge of rocks and minerals.

**Solar System** – Students will demonstrate an understanding and knowledge of planet formation and structure in our solar system and how it relates to that observed in extrasolar systems.

**Sounds of Music** – Teams must construct and tune one device prior to the tournament based on a one-octave 12-tone equal tempered scale and complete a written test on the physics of sound and music concepts.

**Storm the Castle** – Prior to the competition, teams will design, construct and calibrate a single device capable of launching projectiles onto a target and collect data regarding device parameters and performance.

**Write It Do It** – One participant will write a description of an object and how to build it. The other participant will attempt to construct the object from this description.

## TRIAL EVENTS

**Botany** – Participants will demonstrate their knowledge of plant life and general botany principles.

**Digital Structures** – Teams will design and test a Bridge using SkyCiv structural analysis software that meets requirements specified in these rules to achieve the highest structural efficiency while withstanding multiple vertical and lateral loads.

**Write It CAD It** – One participant will write a description of an object and how to build it. The other participant will attempt to construct the object in a computer-aided design (CAD) software from this description.

# DIVISION C EVENT DESCRIPTIONS

## COMPETITION EVENTS

**Anatomy & Physiology** – Participants will be assessed on their understanding of the anatomy and physiology for the human Nervous, Sense Organs, and Endocrine systems.

**Astronomy** – Teams will demonstrate an understanding of Variability of Low & Mid-Mass Stars.

**Bridge** – Teams will design and build a Bridge (Structure) meeting requirements specified in these rules to achieve the highest structural efficiency.

**Cell Biology** – This event integrates content knowledge and process skills in the areas of cell biology and cellular biochemistry.

**Chem Lab** – Teams will complete one or more tasks and answer a series of questions involving the science processes of chemistry focused in the areas of Aqueous Solutions and Oxidation/Reduction.

**Codebusters** – Teams will cryptanalyze and decode encrypted messages using cryptanalysis techniques for historical and modern advanced ciphers.

**Detector Building** – Teams will build a durable Conductivity Device that will accurately measure and display both voltage and concentrations of NaCl in parts per million (ppm) from 0 to 5000 ppm of different water samples.

**Disease Detectives** – Participants will use their investigative skills in the scientific study of disease, inquiry, health, and disability in populations or groups of people.

**Dynamic Planet** – Students will use process skills to complete tasks related to Earth's fresh waters.

**Environmental Chemistry** – This event will focus on fresh water (e.g., residential, industrial or natural), The Clean Water Act of 1972 and 1977, wastewater operator's certification manual (Indiana March 2018 version) and its applications, and various testing of particular analytes using standardized curves, either interpreted or created.

**Experimental Design** – This event will determine the participant's ability to design, conduct and report the findings of an experiment entirely on-site.

**Forensics** – Given a scenario and some possible suspects, students will perform a series of tests. These tests, along with other evidence or test results, will be used to solve a crime.

**Gravity Vehicle** – Teams design, build and test one Vehicle and Ramp that uses the Vehicle's gravitational potential energy as its sole means of propulsion to reach a target as quickly and accurately as possible.

**Green Generation** – Students will demonstrate an understanding of general ecological principles, the history and consequences of human impact on our environment, solutions to reversing trends and sustainability concepts.

**It's About Time** – Teams will answer questions related to time and they may construct and bring one non-electrical device to measure time intervals between 10 and 300 seconds.

**Ornithology** – Participants will be assessed on their knowledge of North American birds.

**Ping-Pong Parachute** – Prior to the tournament, teams will design, build and bring up to three bottle rockets to the tournament to launch a ping pong ball attached to a parachute to stay aloft for the greatest amount of time.

**Remote Sensing** – Participants will use remote sensing imagery, data and computational process skills to complete tasks related to climate change processes in the Earth system.

**Rocks and Minerals** – Teams will demonstrate their knowledge of rocks and minerals.

**Trajectory** – Prior to the competition, teams will design, construct and calibrate a single device capable of launching projectiles onto a target and collect data regarding device parameters and performance.

**WiFi Lab** – Teams must construct an antenna device prior to the tournament that is designed to transmit a signal at 2.4GHz and complete a written test on the principles of electromagnetic wave propagation.

**Wright Stuff** – Prior to the competition teams design, construct and test free flight rubber-powered monoplanes to achieve maximum time aloft.

**Write It Do It** – One student will write a description of an object and how to build it, and then the other student will attempt to construct the object from the description.

## TRIAL EVENTS

**Botany** – Participants will demonstrate their knowledge of plant life and general botany principles.

**Cybersecurity** – Competitors will be assessed on their knowledge of cybersecurity through hands-on tasks as well as theoretical questions focused in the areas of cryptography and web architecture.

**Digital Structures** – Teams will design and test a Bridge using SkyCiv structural analysis software that meets requirements specified in these rules to achieve the highest structural efficiency while withstanding multiple vertical and lateral loads.

**Write It CAD It** – One participant will write a description of an object and how to build it. The other participant will attempt to construct the object in a computer-aided design (CAD) software from this description.



# DIVISION B PARTICIPATING SCHOOLS

State	Team Number	School Name	Coach
Alabama	B35	Our Lady of the Valley Catholic School	Lori Steele
Arizona	B40	BASIS Mesa	Felecia Scanlan
Arkansas	B54	LISA Academy West Middle School	Kirsten Ritchie
California	B01 B02	Sierra Vista Middle School Kennedy Middle School	Shaun Evola Queen-lee Foo
Colorado	B33	Preston Middle School	Elizabeth Loyd
Connecticut	B44	Bedford Middle School	Daniel Cortright
Delaware	B38	Henry B. duPont Middle School	Shalina M Spurlock
District of Columbia	B58	BASIS DC	Walker Timme
Florida	B19 B20	Orlando Science Middle/High Charter School River City Science Academy Middle-High	Emine Demir Gamze Uysal
Georgia	B23 B24	Fulton Science Academy Dodgen Middle School	Pam Walsh Kathy Jacobson
Hawaii	B42	Iolani School	Sheri Kobata
Illinois	B09 B10	Daniel Wright Junior High School Marie Murphy School	Lisa Solesky Darren Persino
Indiana	B29	Thomas Jefferson Middle School	Carol Haller
Iowa	B47	Ames Middle School	Kerri Marsh
Kansas	B27 B50	Pleasant Ridge Middle School Charles Robinson Middle School	David Spieker Charles B. Jenney
Kentucky	B45	Meyzeek Middle School	Bradley Fowler
Louisiana	B56	Glasgow Middle School	Kelly McFatter
Maryland	B28 B48	Clarksville Middle School Burleigh Manor Middle School	Jay Farmer Gayathri Veda
Massachusetts	B39	Jonas Clarke Middle School	Stephanie Kozak
Michigan	B07 B08	Meads Mill Middle School Slauson Middle School	Veena Hebbar Jonathan Hanson
Minnesota	B49	Chippewa Middle School	Christine Warden

State	Team Number	School Name	Coach
Missouri	B21 B22	Ladue Middle School Pembroke Hill Middle School	Martin Long Mary Maxson
Montana	B36	North Middle School	Mary Somerfeld
Nebraska	B37	Mission Middle School	Suzanne Nolte
Nevada	B55	Bob Miller Middle School	Alaine Tingey
New Jersey	B32	Thomas Grover Middle School	Steven Per
New Mexico	B34	Cottonwood Valley Charter School	Tommie McSherry
New York	B03 B04	The Bay Academy Scarsdale Middle School	Dr. Michael Cubbin Jay Gandelman
North Carolina	B05 B06	Fred J. Carnage Middle School Wilmington Academy of Arts & Sciences	Venisha Murphy Lisa Giacomelli
North Dakota	B31	Wachter Middle School	Wade Curren
Ohio	B11 B12	Solon Middle School Mason Middle School	David Brewer Sharon Maynard
Oklahoma	B41	Casady Middle School	Shannon Semet
Oregon	B51	Stoller Middle School	Hemal Trivedi
Pennsylvania	B13 B14	Springhouse Middle School Shady Side Academy	Vivek Borkar Bonnie Maxwell
Rhode Island	B43	Barrington Middle School	Steve Gaurin
South Carolina	B59	Clinton Middle School	Terri O'Shields
South Dakota	B53	Yankton Middle School	Nicole Mehlhaff
Tennessee	B25 B57	Ross N. Robinson Middle School Friendship Christian School	Ashley Peer Jason Miller
Texas	B17 B18	Beckendorff Junior High School Adams Junior High School	Belisa Dias Brittany Schwartz
Utah	B46	Mountain Green Middle School	JennaMarie Harris
Virginia	B15 B16	Longfellow Middle School Cooper Middle School	Julie Cox Lisa Walsh
Washington	B26 B60	Timberline Middle School Redmond Middle School	Asha Mutalik Desai Shalu Mehta
Wisconsin	B30	Hamilton Middle School	Katie Venturini
Wyoming	B52	Carey Junior High	Kade Skinner

PARTICIPATING SCHOOLS

# DIVISION C PARTICIPATING SCHOOLS

State	Team Number	School Name	Coach
Alabama	C32	Auburn High School	Jacque Middleton
Arizona	C40	Catalina Foothills High School	Terry Fortunato
Arkansas	C51	Little Rock Central High School	Amanda Maher
California	C03 C04	Troy High School Mountain View High School	Justin Kim Punam Gollamudi
Colorado	C33	Fossil Ridge High School	Janet McGowen
Connecticut	C35	South Windsor High School	Joshua Kraus
Delaware	C36	The Charter School of Wilmington	Greg Darone
District of Columbia	C60	BASIS DC	Nathaniel Green
Florida	C13 C14	Buchholz High School James S. Rickards High School	Marc Moody Paula Hall
Georgia	C19 C57	Brookwood High School Walton High School	Charles Thornton Doug Wolfe
Hawaii	C41	Iolani School	Narayan S. Raja
Illinois	C07 C08	Adlai E. Stevenson High School New Trier High School	Amerigo Carnazzola Alexander Howe
Indiana	C25	Carmel High School	Cyndy Henry
Iowa	C42	Ames High School	Emma Knopf
Kansas	C30	Blue Valley North High School	Barbara Turnbull
Kentucky	C37	duPont Manual High School	Dennis Kuo
Louisiana	C52	Baton Rouge Magnet High School	Jonathan Wilson
Maine	C53	Falmouth High School	Andrew Njaa
Maryland	C26	Centennial High School	Meenakshi Sodhi
Massachusetts	C24	Acton-Boxborough Regional H.S.	Brian Dempsey
Michigan	C11 C12	Grand Haven High School Northville High School	Michael Reed Anuradha Danasekaran
Minnesota	C28	Wayzata High School	Jack Fariss
Mississippi	C49	Northwest Rankin High School	Kimberly Phillips
Missouri	C22	The Pembroke Hill School	Kimberly Cho
Montana	C38	Hamilton High School	Vanessa Haflich

State	Team Number	School Name	Coach
Nebraska	C31	Lincoln Science Focus	Mark James
Nevada	C46	Ed W. Clark High School	James Miller
New Hampshire	C50	Lebanon High School	John Tietjen
New Jersey	C23	Montgomery High School	Jason Sullivan
New Mexico	C39	La Cueva High School	Tammy Lara
New York	C01 C02	Ward Melville High School Great Neck South High School	Jenny Serigano James Truglio
North Carolina	C05 C06	North Carolina School of Science and Mathematics William G. Enloe High School	Jacob Brown Shawn Culbreth
North Dakota	C34	Century High School	Scott Johnson
Ohio	C15 C16	Solon High School Mason High School	Cherese Fiorina Steven Seiler
Oklahoma	C47	Casady School	Paul Marley
Oregon	C48	St. Mary's Academy	Cindi Hounton
Pennsylvania	C09 C10	Cumberland Valley High School Harrington High School	Christopher Irvin Brian Gauvin
Rhode Island	C43	Barrington High School	Sonalya Jayasuriya
South Carolina	C45	Clinton High School	Terri O'Shields
South Dakota	C59	Brookings High School	Jessica Blocker
Tennessee	C27	Collierville High School	Shanmugam Saravanakumar
Texas	C17 C18	Seven Lakes High School Clements High School	Julie Irving Geoffrey Hart
Utah	C44	West High School	Crystal King
Vermont	C55	Burr and Burton Academy	Amy Newbold
Virginia	C20 C58	Lake Braddock High School Thomas Jefferson H.S. for Science and Tech.	Emily Owens Aubrie Holman
Washington	C29	Tesla STEM High School	Andy Christensen
West Virginia	C56	Cabell Midland High School	Brian McNeel
Wisconsin	C21	Marquette University High School	Nicole Williams
Wyoming	C54	Kelly Walsh High School	Paul Kasza
Japan	C61	High School at Komaba, University Tsukuba	Takahiro Sakata

# TOURNAMENT DAY SCHEDULE - DIVISION B

SATURDAY, MAY 14

BLOCK EVENTS	HST	PDT	MDT	CDT	EDT
Trial Events (Botany, Digital Structures, Write It CAD It)	<b>3:50 AM</b>	<b>6:50 AM</b>	7:50 AM All Teams Except HI, AZ, CA, OR, WA, NV	8:50 AM All Teams Except HI, AZ, CA, OR, WA, NV	9:50 AM All Teams Except HI, AZ, CA, OR, WA, NV
Crave the Wave, Green Generation, Rocks & Minerals	<b>5:00 AM</b>	8:00 AM All Teams Except HI	9:00 AM All Teams Except HI	10:00 AM All Teams Except HI	11:00 AM All Teams Except HI
Codebusters, Meteorology, Ornithology	<b>6:10 AM</b>	9:10 AM All Teams Except HI	10:10 AM All Teams Except HI	11:10 AM All Teams Except HI	12:10 PM All Teams Except HI
Anatomy & Physiology, Dynamic Planet	<b>7:20 AM</b>	10:20 AM All Teams Except HI	11:20 AM All Teams Except HI	12:20 PM All Teams Except HI	1:20 PM All Teams Except HI
Bio Process Lab, Crime Busters, Experimental Design	8:30 AM All Teams	11:30 AM All Teams	12:30 PM All Teams	1:30 PM All Teams	2:30 PM All Teams
Disease Detectives, Road Scholar, Write It Do It	9:40 AM All Teams	12:40 PM All Teams	1:40 PM All Teams	2:40 PM All Teams	3:40 PM All Teams
Food Science, Solar System, Sounds of Music (Test Only)	10:50 AM All Teams	1:50 PM All Teams	2:50 PM All Teams	3:50 PM All Teams	4:50 PM All Teams
Crave the Wave, Green Generation, Rocks & Minerals	12:00 PM HI	<b>3:00 PM</b>	<b>4:00 PM</b>	<b>5:00 PM</b>	<b>6:00 PM</b>
Trial Events (Botany, Digital Structures, Write It CAD It)	HI	AZ, CA, OR WA, NV			
Codebusters, Meteorology, Ornithology	1:10 PM HI	<b>4:10 PM</b>	<b>5:10 PM</b>	<b>6:10 PM</b>	<b>7:10 PM</b>
Anatomy & Physiology, Dynamic Planet	2:20 PM HI	<b>5:20 PM</b>	<b>6:20 PM</b>	<b>7:20 PM</b>	<b>8:20 PM</b>
Times in <b>red</b> are for Event Supervisor reference only. No team will compete in the main Tournament (non-Trial Events) prior to 8:00 AM local time.					

SELF-SCHEDULED EVENTS			
Bridge	Mousetrap Vehicle	Storm the Castle	Available Event Slots start @ 8:00 AM (PDT).
Electric Wright Stuff	Ping Pong Parachute		
Mission Possible	Sounds of Music (Performance)		



# TOURNAMENT DAY SCHEDULE - DIVISION C

SATURDAY, MAY 14

BLOCK EVENTS	HST	PDT	MDT	CDT	EDT
Trial Events (Botany, Cybersecurity, Digital Structures, Write It CAD It)	<b>3:50 AM</b>	<b>6:50 AM</b>	7:50 AM All Teams Except HI, AZ, CA, OR, WA, NV	8:50 AM All Teams Except HI, AZ, CA, OR, WA, NV	9:50 AM All Teams Except HI, AZ, CA, OR, WA, NV
Codebusters, Dynamic Planet, Ornithology	<b>5:00 AM</b>	8:00 AM All Teams Except HI	9:00 AM All Teams Except HI	10:00 AM All Teams Except HI	11:00 AM All Teams Except HI
Disease Detectives, It's About Time (Test), Remote Sensing	<b>6:10 AM</b>	9:10 AM All Teams Except HI	10:10 AM All Teams Except HI	11:10 AM All Teams Except HI	12:10 PM All Teams Except HI
Detector Building (Test), Green Generation, Rocks & Minerals	<b>7:20 AM</b>	10:20 AM All Teams Except HI	11:20 AM All Teams Except HI	12:20 PM All Teams Except HI	1:20 PM All Teams Except HI
Chem Lab, WiFi Lab (Test), Write It Do It	8:30 AM All Teams	11:30 AM All Teams	12:30 PM All Teams	1:30 PM All Teams	2:30 PM All Teams
Cell Biology, Experimental Design, Forensics	9:40 AM All Teams	12:40 PM All Teams	1:40 PM All Teams	2:40 PM All Teams	3:40 PM All Teams
Anatomy & Physiology, Astronomy, Environmental Chemistry	10:50 AM All Teams	1:50 PM All Teams	2:50 PM All Teams	3:50 PM All Teams	4:50 PM All Teams
Codebusters, Dynamic Planet, Ornithology	12:00 PM HI	<b>3:00 PM</b>	<b>4:00 PM</b>	<b>5:00 PM</b>	<b>6:00 PM</b>
Trial Events (Botany, Cybersecurity, Digital Structures, Write It CAD It)	HI	AZ, CA, OR WA, NV			
Disease Detectives, It's About Time (Test), Remote Sensing	1:10 PM HI	<b>4:10 PM</b>	<b>5:10 PM</b>	<b>6:10 PM</b>	<b>7:10 PM</b>
Detector Building (Test), Green Generation, Rocks & Minerals	2:20 PM HI	<b>5:20 PM</b>	<b>6:20 PM</b>	<b>7:20 PM</b>	<b>8:20 PM</b>
Times in <b>red</b> are for Event Supervisor reference only. No team will compete in the main Tournament (non-Trial Events) prior to 8:00 AM local time.					

## SELF-SCHEDULED EVENTS

Bridge	It's About Time (Device)	WiFi Lab (Device)	Available Event Slots start @ 8:00 AM (PDT).
Detector Building (Device)	Ping Pong Parachute	Wright Stuff	
Gravity Vehicle	Trajectory		



# GLOBAL AMBASSADOR TEAM FROM JAPAN

In 2009, Board Members Dr. Gerard Putz and Jim Woodland traveled to Tokyo, Japan, to present Science Olympiad concepts to Japanese education officials from the Ministry of Education (MEXT) and the Japan Science and Technology Agency (JST) at "Science Agora." A partnership between Science Olympiad and JST was born, founded on a shared passion for making science competition fun and exciting for all students.

In April 2022, JST hosted its 11th Annual Japan High School Science Championships (JHSSC), where the Grand Prize for High School at Komaba, University Tsukuba is a chance to participate in the 2022 Science Olympiad National Tournament presented in partnership with Caltech. As they have done at previous National Tournaments, Japanese students will join their American peers online in tests, march in the virtual Parade of States and participate as unranked guests in selected Science Olympiad events.

**Please welcome the 2022 JHSSC Winners and Coach from High School at Komaba, University Tsukuba to the National Tournament!**



## 2022 JHSSC WINNERS

# IMAGINATION IS THE SPARK THAT IGNITES THE FIRE OF CREATIVITY

Richard L. Peterson



# SCIENCE OLYMPIAD

## STATE DIRECTORS

**Mary Lou Ewald**  
Alabama

**Chris Gooch**  
Alaska

**Reina Gomez**  
Arizona

**Dr. Eric Kaufmann**  
Arkansas

**Barbara Little**  
Northern California

**Dr. Peter Hung**  
Southern California

**Dr. Allan Nolan**  
Colorado

**Janet Belval**  
Connecticut

**Gordon Lipsy**  
Delaware

**Susan Karpatkin**  
District of Columbia

**Valerie Ledford**  
Florida

**Scott Cole**  
Georgia

**Jason Tanaka**  
Hawaii

**Gary Carlson**  
Idaho

**Joe Simmons**  
Illinois

**Dan Nichols**  
Indiana

**Dr. Jill Maroo**  
Iowa

**Jill Fisher**  
Kansas

**Taylor Blair**  
Kentucky

**Bruce Sherman**  
Louisiana

**David Sturm**  
Maine

**Dr. Robert Bruce**  
Maryland

**Dr. Brian Niece**  
Massachusetts - B

**Martha Moore**  
Massachusetts - C

**Paul Voydanoff**  
Michigan

**Brandi Gordon**  
Minnesota - B

**Katie Foley**  
Minnesota - C

**Dr. Allison Downing**  
Mississippi

**Greg Spiegel**  
Missouri

**Suzi Taylor**  
Montana

**Susan Hester**  
Nebraska

**Tracy Viscosi**  
Nevada

**Dr. Nicole Eyt**  
New Hampshire

**Dr. Jennifer Wirt**  
New Jersey

**Dr. Sharon Sessions**  
New Mexico

**John Beauregard**  
New York

**Kim Gervase**  
North Carolina

**Dr. Azer Akhmedov**  
North Dakota

**Joel Nelson**  
Ohio

**Bob Melton**  
Oklahoma

**Ashley da Silva**  
Oregon

**Dave Moyer**  
Pennsylvania

**Dr. James Magyar**  
Rhode Island

**Dr. Jennifer Albert**  
South Carolina

**Clark Bennett**  
South Dakota

**Dr. David Stanislawski**  
Tennessee

**Dr. Nancy Magnussen**  
Texas

**Dr. Carrie Jo Bucklin**  
Utah

**Dr. Leon Walls**  
Vermont

**Karen Emmons**  
Virginia

**Sue Murphy**  
Washington

**Dr. Sachiko McBride**  
West Virginia

**Nicole Dallman**  
Wisconsin

**Dr. Paul Marquard**  
Wyoming





# NATIONAL EVENT SUPERVISORS

## DIVISION B EVENT SUPERVISORS

Event	Lead Supervisor	Event	Lead Supervisor
Anatomy & Physiology	Ashwin Ghadiyaram	Meteorology	Hugo Yu
Bio Process Lab	Greg Palmer	Mission Possible	Manley Midgett
Botany	Matt Kramer		Conen Morgan
Bridge	Greg Marconnet	Mousetrap Vehicle	Dennis Papesh
Codebusters	Caleb Chiang	Ornithology	Dan Hartley
Crave the Wave	Russ Burleson		Kathy Hartley
Crime Busters	Adrian Huang	Ping Pong Parachute	David Zheng
Digital Structures	George Sun	Road Scholar	Brendan Herlihy
Disease Detectives	Ernest Lee	Rocks & Minerals	Emily Miaou
Dynamic Planet	Anand Gnanadesikan	Solar System	Aditya Shah
Electric Wright Stuff	Jeff Anderson	Sounds of Music	Dave Moyer
Experimental Design	Jasmine Windsor	Storm the Castle	Jeremy Gerber
Food Science	Victor Lam	Write It CAD It	Taylor Chin
Green Generation	Karen Pham	Write It Do It	Shelly Fitzgerald

## DIVISION C EVENT SUPERVISORS

Event	Lead Supervisor	Event	Lead Supervisor
Anatomy & Physiology	Phillip Liu	Forensics	Linda Wozniowski
Astronomy	Tad Komacek	Gravity Vehicle	Brother Nigel Pratt
Botany	Steph Gu	Green Generation	Robyn Fischer
Bridge	Chuck Stachovic	It's About Time	Karen Emmons
Cell Biology	Annika Gomez		Ian Emmons
Chemistry Lab	Allen Leung	Ornithology	Sam Bressler
Codebusters	John Toebes	Ping Pong Parachute	Niraj Ganesh
Cybersecurity	Eric Ma	Remote Sensing	Matt Voss
Detector Building	Mike Smith	Rocks & Minerals	Gary Vorwald
	Stephen Gee	Trajectory	Jerry Glass
Digital Structures	Shivam Misra	WiFi Lab	Andy Hamm
Disease Detectives	Ralph Cordell	Wright Stuff	Mike Jester
Dynamic Planet	Ryan Anselm	Write It CAD It	Cindy Cao
Environmental Chemistry	John Aros	Write It Do It	Miriam Sun
Experimental Design	Peter Zhu		Eric Rowley

# NATIONAL EVENT SUPERVISOR ASSISTANTS

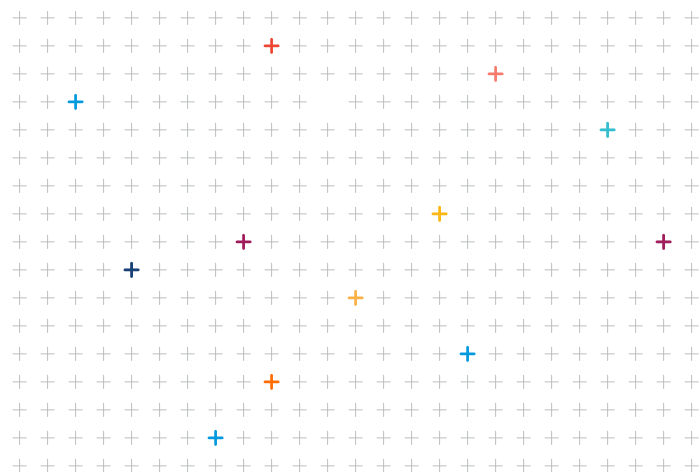
Jaehyun Ahn	Tingzhi He	Chris Mistrion	Diran Tan
Eric Amaro	Beth Heger	Alanna Mori	Eric Tao
Brian Amaro	Victor Hesu	Samyok Nepal	Felianne Teng
Ariel Anchanattu	Brian Hoffman	Harrison Ngue	Vinny Thai
Chuck Andraka	Ryan Hon	Tuan Nguyen	Luke Timper
Christopher Anisi	Wesley Huang	Nga Nguyen	Connor Todd
Carlos Ayala	Johnny Huang	Owen Noga	Chris Totoiu
Lauren Bajo-Smith	Emma Isella	Angelica Olmedo	Violet Tu
Alan Bao	Jenny Ji	Seohyun Park	Brian Turnbull
Colin Barber	Dhruva Karkada	Akshay Patwardhan	Vivek Vajipey
John Beauregard	Christina Kasch	Anson Pham	Lorenzo van Munoz
Maddy Bender	David Kessler	Kelly Pham	Antonio Velasco
Allison Birbal	Ryungin Kim	Sahil Pontula	Ethan Vien
Bryan Blaschke	Claire Kim	Yang-Jie Qin	Erin Wang
Michael Bouklas	Jiwoo Kim	Pete Rado	Yibo Wang
Cameron Brown	Sulekha Kishore	James Ragan	Clara Wang
Patrick Cai	Mark Kramer	Aryan Rajesh	Tate Welty
Dangli Cao	Pranit Kumaran	Jay Ralph	Colton Werner
Lynn Rose Cardenas	Emerson Lai	Anirudh Rangaswamy	Olivia White
Jason Chang	Stephanie Lamb	Rossana Rico	Ava Wu
Allen Chang	Robert Lee	Lalith Roopesh	Iris Xia
Stephanie Chen	Nicole Lee	Nicholas Rui	Daniel Xie
Chloe Cheng	Ian Lee	Nicholas Salanitri	Miyu Yamane
Nikki Cheung	Adelaide Leung	Randall Scharpf	John Yang
Emmet Cleary	Haoyu Li	Tom Schneider	Harry Yang
Evan Dicker	Jeannie Liang	Erik Schrunk	Aidan York
KhueDang Doan	Seth Lieblich	Liam Silvera	Donna Young
Dave Drummer	Ethan Lin	Krittanon Sirorattanakul	Christina Yu
Benny Ehlert	Yi Lin	Janet Smith	Maiya Yu
Kira Emmons	Kristi Liu	Matthew Song	Felix Zhan
Scott Evoy	Renee Long	Gary Song	Andrew Zhang
Matthew Evoy	Megan Luo	Nick Sprague	Camille Zhang
Zoe Goldblum	Christopher Luo	Varun Sudunagunta	Catherine Zheng
Jareth Gomes	Lucas Mansfield	Kai Svenson	Eric Zheng
Conor Gowder	Scott Maurer	Saleh Tafesh	
Katherine He	Ryan Mayden	Michael Taleff	

2022

# NATIONAL TOURNAMENT PLANNING COMMITTEE

Ethan Alderete  
Yiyi Cai  
Allen Chang  
Jason Chang  
Thuan Duong  
Zoom Duong  
Reina Gomez  
Wesley Huang  
Peter Hung  
Emma Isella  
Jenny Ji  
Kevin Kha  
Sulekha Kishore  
Albert Kyi

Eric Ma  
Emily Miaou  
Tuan Nguyen  
Jolly Patro  
Chris Pope  
Erik Schrunck  
George Sun  
Kai Svenson  
Felianne Teng  
Kayton Truong  
Chris Wang  
David Zheng  
Luke Zhou



# NATIONAL BOARD, COMMITTEES, and STAFF

## NATIONAL EXECUTIVE BOARD

<b>Dr. Gerard Putz</b>	<i>Founding Board Member and Officer (1984-2019)</i>
<b>Steve Betza</b>	<i>Board Chair, Lockheed Martin (ret.)</i>
<b>Angela Davis</b>	<i>Board Vice Chair &amp; Information Technology Manager at The Ohio State University</i>
<b>Sharon Putz</b>	<i>Co-Founder &amp; Senior Advisor</i>
<b>Jennifer Kopach</b>	<i>CEO &amp; SVP Marketing Communications</i>
<b>Dr. Jon Pedersen</b>	<i>Dean, College of Education, Oklahoma State University</i>
<b>Renae Cubbin</b>	<i>VP Tax &amp; Board Treasurer, GE Healthcare</i>
<b>Dr. Peter Hung</b>	<i>Project Leader &amp; Board Secretary, The Aerospace Corporation</i>

## ADVISORY COMMITTEE

<b>Colin Barber</b>	Co-Chair, Science Olympiad Alumni Task Force, University of California, Berkeley
<b>Paul Carff</b>	Automation Systems, Google, South Carolina
<b>CeAnn Chalker</b>	Tech & Engineering Chair, Ohio
<b>Dr. Ralph Cordell</b>	Epidemiologist, Georgia
<b>Dr. Ronda Hamm</b>	Global Academic Relations Leader, Corteva Agriscience, Indiana
<b>Albert Kyi</b>	2022 Science Olympiad National Tournament, Co-Director, Caltech
<b>Dr. Elizabeth Mulkerrin</b>	Henry Doorly Omaha Zoo & Aquarium, VP of Education, Nebraska, President-Elect, NSTA 2021-2022
<b>Jolly Patro</b>	2022 Science Olympiad National Tournament, Co-Director, Caltech
<b>Dr. Kelly Price</b>	STEM Educator, Florida
<b>Stephanie Sang</b>	Co-Chair, Science Olympiad Alumni Task Force, University of Chicago
<b>Joe Simmons</b>	Illinois Science Olympiad State Director, Ward's Science
<b>Donna Young</b>	NASA Educator, Nevada





# NATIONAL BOARD, COMMITTEES, and STAFF

## NATIONAL RULES COMMITTEE CHAIRS

<b>Karen Lancour</b>	Life, Personal & Social Science
<b>Dr. Dusty Schroeder</b>	Earth & Space Science
<b>Dr. Alan Chalker</b>	Physical Science
<b>Dr. Linda Wozniowski</b>	Chemistry
<b>CeAnn Chalker</b>	Technology & Engineering
<b>Dan Nichols</b>	Inquiry & Nature of Science

## NATIONAL INNOVATION TASK FORCE

<b>Dr. Alan Chalker</b>	Chair, Ohio Supercomputer Center
<b>Sam Carigliano</b>	CEO, SkyCiv, Australia
<b>Paul Carff</b>	Field Automation Deployment Engineering Manager, Google
<b>Mary Edly-Allen</b>	Educator and Illinois State Representative

## NATIONAL OFFICE STAFF

<b>Sharon Putz</b>	Science Olympiad Co-Founder & Senior Advisor
<b>Jenny Kopach</b>	CEO, Senior Vice President - Marketing Communications
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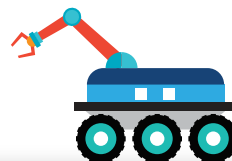
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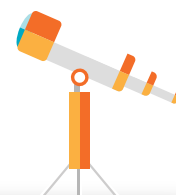
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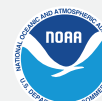
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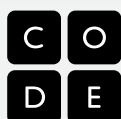
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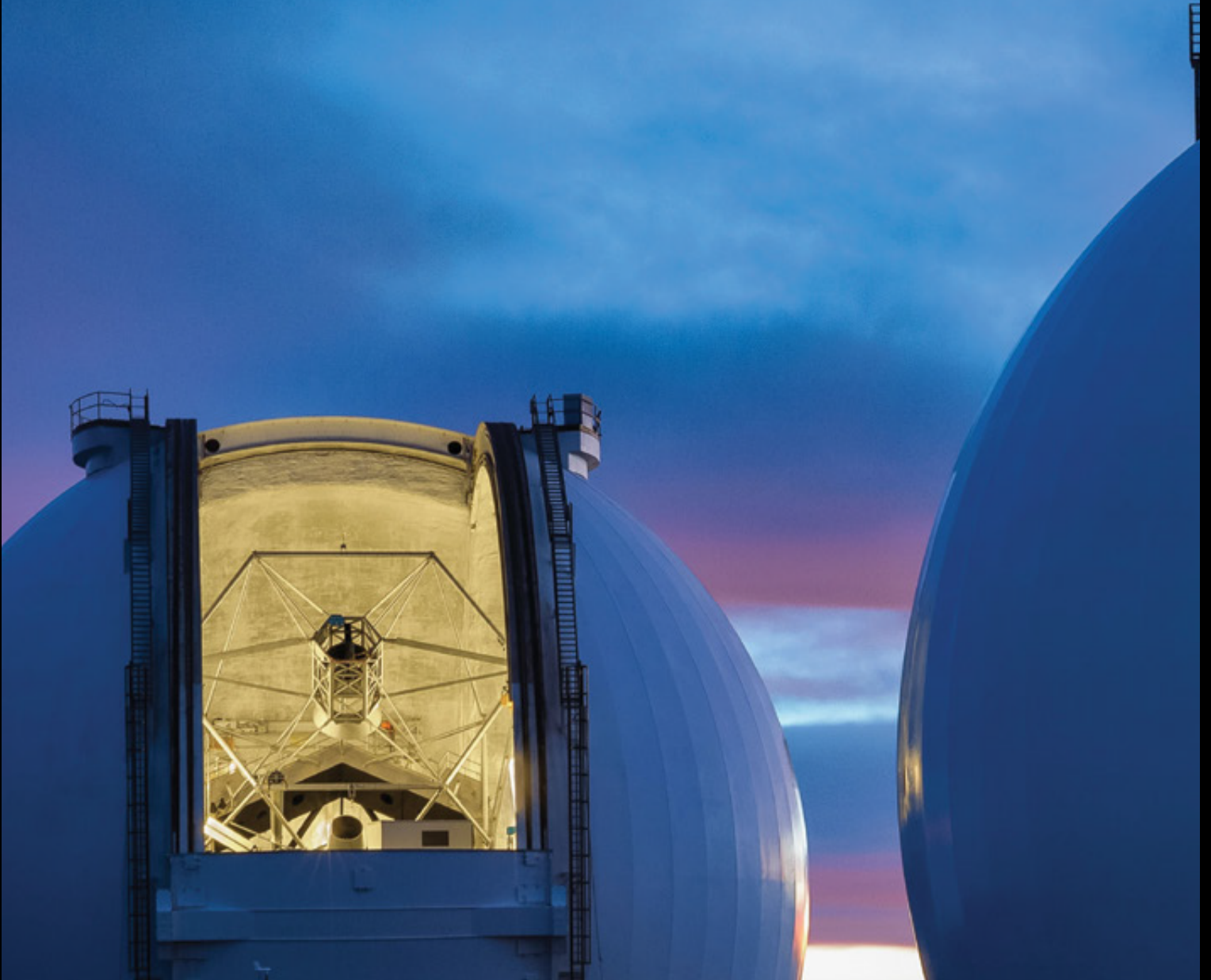


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