













2023 Annual Report













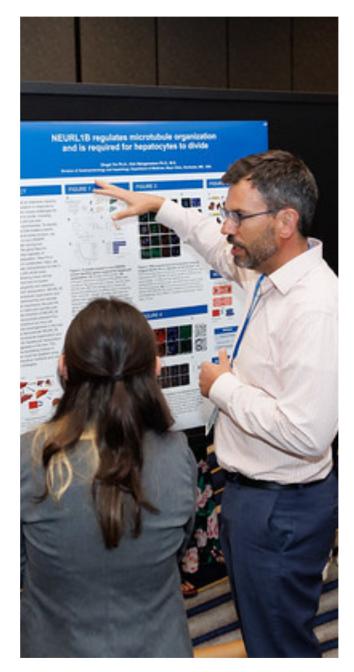


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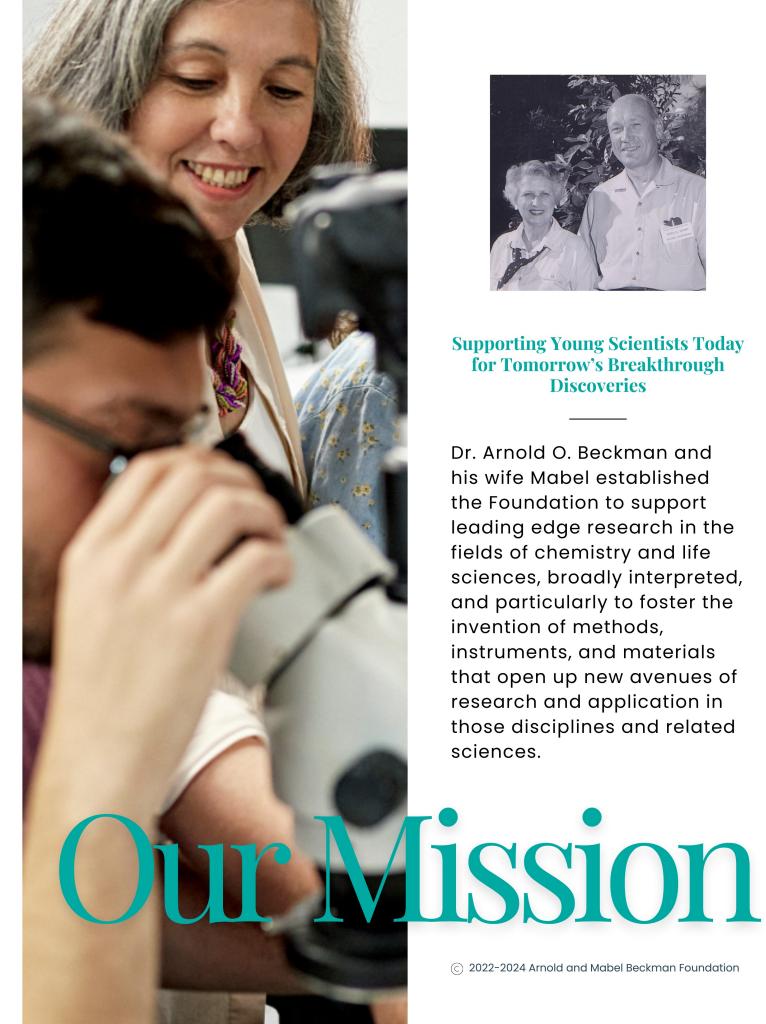
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Supporting Young Scientists Today for Tomorrow's Breakthrough **Discoveries**

Dr. Arnold O. Beckman and his wife Mabel established the Foundation to support leading edge research in the fields of chemistry and life sciences, broadly interpreted, and particularly to foster the invention of methods, instruments, and materials that open up new avenues of research and application in those disciplines and related sciences.

The Excitement of Science A Message from the Executive Director

Dear "Beckman Family" and Friends,

Why do I love science? Science is ever exploring, ever changing, and always growing. Science is action, and just when you think it's all figured out, new discoveries force you to shift and adapt your perspective. I first felt this excitement with high school chemistry and physics classes, with inspirational teachers devoted lots of class who time with experiments designed to surprise and challenge us to question what we were so sure that we knew.

Some of my favorite activities are local science fairs and community activities to inspire young people about science. Here in our local community of Orange County, we have lots of fun in the community recognizing the students who participate in the **Orange County Science and Engineering Fair**, we collaborate with the **Segerstrom Center for the Arts** to put on a "Beckman Arts & Science Family Festival" to bring a science festival for kids to the arts community, and we have helped the **Los Alamitos Youth Center** to develop an after-school science program for young girls which is run by high school volunteers.

Are you involved in a local community science activity as well? This year we launched a new program for our awardees—if you are a leader in a local youth STEM activity, let us know and we may be able to help support a special project with you too! (for details: https:// www.beckman-foundation.org/localcommunity-support/awardee-communitysupport-grants/)



Anne Hultgren, PhD Executive Director

Let's all remember how important it is to share our own excitement of science to inspire the next generation!

This year we lost our friend **Dr. Paul Berg,** who was the inaugural Beckman Center Director at Stanford University and the key visionary who shaped the original direction and mission of the Beckman Center for Molecular & Genetic Medicine.

We saw leadership transitions at three of the Beckman Institutes, and we are pleased to welcome **Dr. John Carpten** to City of Hope as the new Beckman Institute Director, **Dr. Cathy Murphy** as interim Institute Director at University of Illinois, Urbana-Champaign, and **Dr. Bernard Choi** as acting Institute Director at University of California, Irvine.

Finally, our Board of Directors held a celebration to recognize the service of **Dr. Larry Kline** who served on the Board since 2013 and was Dr. Beckman's personal physician at Scripps Medical Center during the final years of his life. We welcome **Ms. Heather Haworth** from Edwards Lifesciences as the newest member of the Board of Directors!

Did You Know?

Since the start of the Beckman Young Investigator Program in 1991, there have been **412** awardees selected.

Of our BYI Awardees, **33** have been elected to the National Academy of Sciences.

Of BYIs,

Awarded since 1991: 8% are NAS Members

Awarded 1991 - 2013: 10.5% are NAS Members

Of National Academy Members,

Elected since 1991: 1.3% are BYI Awardees

Elected since 2001: 1.7% are BYI Awardees

Awardee Highlights from the Past Year



FDA Approved First CRISPR/Cas9 Therapy

Congratulations went out to 1996 BYI and 2020 Nobel Laureate **Jennifer Doudna, PhD** on the FDA approval of the first CRISPR/Cas9 gene editing therapy for patients with sickle cell disease.



2023 BYI Yayuan Liu, PhD, 2022 BYI Lisa Poulikakos, PhD 2019 AOB Postdoc Dayne Swearer, PhD Received the 2023 David and Lucille Packard Award for Science and



Beckman Institute Director at City of Hope, John Carpten, PhD 2002 BYI Guoping Feng, PhD 2003 BYI Darrell Irvine, PhD 2007 BYI Brent Stockwell, PhD Elected to the National Academy of Medicine



Engineering

2004 BYI Guillermo Ameer, PhD 1999 BYI Claudia Turro, PhD

Elected to the American Academy of Arts and Sciences



2014 BYI Prashant Jain, PhD Received the 2023 Akron American Chemical Society (ACS) Award

Awardee Highlights—cont'd.



2005 BYI Theresa M. Reineke, PhD Accepted to 2023 Class of ACS Fellows



2020 BYI Stavroula Hatzios, PhD

Named winner of the 2023 ACS Infectious Diseases Young Investigator/ACS Division of Biological Chemistry Young Investigator Award

1998 BYI and 2022 Nobel Laureate Carolyn Bertozzi, PhD

Named a Priestly medalist, American Chemical Society's highest honor





1995 BYI Susan Marqusee, MD/PhD Chosen to lead the Directorate for Biological Sciences at the National Science Foundation (NSF)



2016 AOB Postdoctoral Fellow Danielle Mai, PhD

Awarded the 2023 Spring Arthur K. Doolittle Award from the ACS Division of Polymeric Materials: Science and Engineering Division (PMSE)



Above: Members of the 2023 Arnold and Mabel Beckman Foundation's Board of Directors.

(I—r): Mr. Shlomi Nachman, Mrs. Jackie Dorrance, Dr. Jeff Johnston, Mrs. Lynn Rahn, Dr. Andrew Lyon, Ms. Kristen Monson, Mr. Steven Pizula, Dr. Jane Buchan

I. Foundation Leadership

"Hire the best people and then get out of their way." - Dr. Beckman

We're grateful to the team of individuals who dedicate themselves to the success of the Arnold and Mabel Beckman Foundation, including:



Board of Directors

Dr. Jane Buchan, PhD Mrs. Jacqueline Dorrance (Secretary) Mrs. Heather Haworth Dr. David Hollander, MD Dr. Jeffrey Johnston, PhD (Vice-Chair) Dr. Lawrence Kline, MD Dr. Andrew Lyon, PhD & '00 BYI (Chair) Ms. Kristen Monson Mr. Shlomi Nachman Mr. Steven Pizula Mrs. Lynn Rahn (Treasurer) Dr. Deborah Wuttke, PhD & '99 BYI

LEADERSHIP

Foundation Staff

Ms. Catrina Bryant, BA Ms. Jackie Chamberlin, CIMA, CPA Ms. Esther Devanney, BS Mrs. Tiana Godges, BA Dr. Anne Hultgren, PhD Mrs. Nicole Patras, BA Ms. Kaerie Ray, MBA Mr. Tim Rogers, MA Ms. Rosary Videc, BA

Scientific Advisory Council

Dr. Annaliese Franz, PhD Dr. Kent Hill, PhD (Co-Chair) Dr. Philip LeDuc, PhD Dr. Anne McNeil, PhD (Co-Chair) Dr. Karl Mueller, PhD Dr. Kim Orth, PhD Dr. Jason Shear, PhD

The Foundation's Program Executive Committees are instrumental in leading the proposal review committees, developing final award recommendations, and conducting annual assessments of the program requirements. Our special thanks to the 2023 Executive Committee members:

BYI Executive Committee

Dr. Heather Allen, PhD Dr. Rae Anderson, PhD Dr. Sean Elliot, PhD Dr. Elena Gracheva, PhD Dr. Julianne Grose, PhD Dr. Jonathon Lai, PhD Dr. Jonathon Lai, PhD Dr. Alexander Li, PhD Dr. David Piston, PhD Dr. Jonathon Wilker, PhD

BSP Executive Committee

Dr. Nicholas Ball, PhD Dr. Ming Hammond, PhD Dr. Margaret Saha, PhD Dr. Arun Sethuraman, PhD

AOB Postdoctoral Fellows Executive Committee

- Dr. Carolyn Anderson, PhD
- Dr. Jeremey Baskin, PhD
- Dr. Steven Leone, PhD
- Dr. George O'Doherty, PhD



Above: Lead halide pervoskite in the lab of 2017 BYI Erik Grumstrup, PhD.

II. Beckman Young Investigator Program

The Beckman Young Investigator (BYI) Program provides four years of research support amounting to \$600,000 to promising young faculty members in the early stages of their academic careers in the chemical and life sciences, broadly defined, who have not yet received a major award from another organization.

Projects must be truly innovative, highrisk, and show promise for contributing to significant advances in chemistry and the life sciences, with preference to those that foster the invention of methods, instruments and materials that will open new avenues of research in science.

2023 BYI National Recognition:

Elected to National Academy of Medicine: Brent Stockwell, Guoping Feng, Darrell Irvine Lucile Packard Awardees: Lisa Poulikakos, Yayuan Liu NIH New Innovator Awardees: Steven Banik, Christina Kim

2023 BYI Program Stats:

 225+ Applicants
11 Researchers Selected for Awards Representing 11 Institutions
\$6 Million in Funding for '19-'23 Awardees

2023 Beckman Young Investigator Awardees

Mikael Backlund, PhD University of Illinois, Urbana Champaign

Steven Banik, PhD Stanford University



Zachary Calamari, PhD Baruch College (CUNY) "Integrating genomics and 3D shape to explore novel anatomy in hoofed mammals"

David Hershey, PhD University of Wisconsin, Madison

Timothy Johnstone, PhD University of California, Santa Cruz



Laure Kayser, PhD University Delaware "Dynamically Crosslinked and Conductive Metallopolymers for Printable Actuators in Haptic Interfaces" Christina Kim, PhD

University of California, Davis



Yayuan Liu, PhD Johns Hopkins University "Developing correlative fluorescence microscopy as a new characterization platform for electrochemical materials and processes"

Andrew Modzelewski, PhD University of Pennsylvania



Abdoulaye Ndao, PhD University of California, San Diego "Shedding Structured Light on Fairness in Healthcare"

Thao Tran, PhD Clemson University





Above: AOB Postdoctoral Fellow James Gaynor's research in the Attosecond Atomic and Molecular Dynamics Laboratory at UC Berkeley uses a neon-filled hollow-core fiber compressor (pictured) to generate laser pulses covering 500-1000 nm with sub-5 femtosecond pulse durations. Image credit: Dr. James D. Gaynor and Dr. Ashley P. Fidler

III. Arnold O. Beckman Postdoctoral Fellows

The Arnold O. Beckman Postdoctoral Fellows Award Program supports first and second year postdoctoral fellows at research institutions who are judged to have the highest potential for success in a career in chemistry, and who will become the next generation of leaders and innovators in science, engineering, and technology.

The program awards \$180,000 over two years for salary, fringe benefits, and research expenditures; instrumentation fellowships will receive additional one-time \$200,000 for material/development costs.

2023 Postdoc Program Stats:

55 Applicants 16 Researchers Selected for Awards

11 Institutions Represented

\$2.85 Million in Funding for '20 -'23 Awardees



2023 Arnold O. Beckman Postdoctoral Fellows

Alexander Hurben, PhD

University of California, Berkeley



Ashley Arcidiacono, PhD University of Chicago "Tailored Molecular Interfaces for Spin Control and Readout"

Christian Oswood, PhD Massachusetts Institute of Technology

Clorice Reinhardt, PhD Massachusetts Institute of Technology

Grigorri Skorupskii, PhD Princeton University

Jake Jagannathan, PhD University of North Carolina, Chapel Hill

Jakob Dahl, PhD Massachusetts Institute of Technology

James Law, PhD Massachusetts Institute of Technology

Jonathan Schultz, PhD Duke University

Kelsie Wentz, PhD John Hopkins University Matthew Hannigan, PhD New York University

Neil Razdan, PhD Massachusetts Institute of Technology

Stephanie Hart, PhD University of California, Berkeley



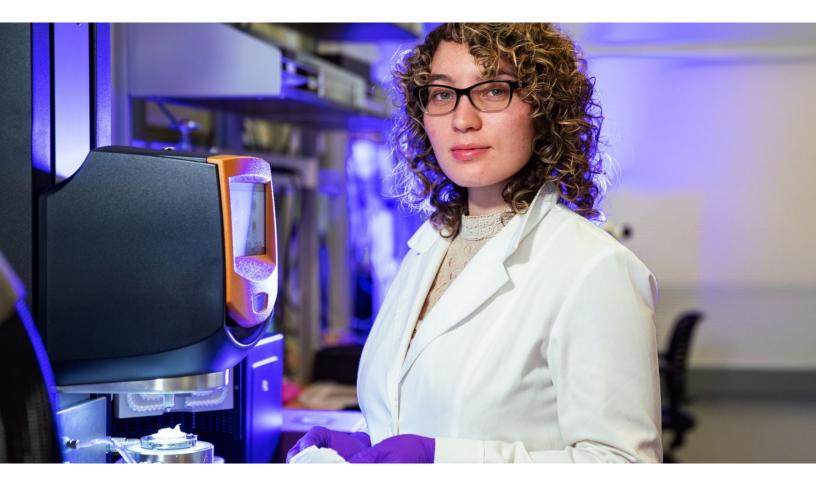
Steven Chapman, PhD Northwestern University "Photoresponsive Cross-Linkers for Multi-functional Adaptive Materials"

Steven Chavez, PhD Stanford University



Suman Gunasekaran, PhD Cornell University "Ultrafast angle-resolved spectrometer and tunable microcavity for vacuumfield catalysis"





Above: 2022 Beckman Scholar Clara Rodriguez in the lab for her Skin Topography Analysis Over Time for Forensic Application research project at SUNY Binghamton in the lab of Professor Guy German.

IV. Beckman Scholars Program

The Beckman Scholars Program provides in-depth, sustained research an experience for exceptional undergraduate students in chemistry, biological sciences, or interdisciplinary combinations thereof. The program's award of \$26,000 for a student and mentor 15 team over continuous months of research, in with the Annual Beckman conjunction offers academically Symposium, an stimulating educational and unique experience.

The award spans three years and six student/mentor pairs are named per institution; applications by invitation only.

BSP National Recognition in 2023:

2023 Goldwater Scholars: Derek Chien, Helen Xia

2023 NSF GRFPs Recipients:

Arabella Hunter, Hannah Small, Parker Sornberger, Katherine Yan

2023 BSP Program Stats:

14 Institutions Selected for 2023 Awards

76 Scholar/Mentor Teams began Research Projects

\$1.8+ Million in Funding for '21-'23 Awardees

2023 Beckman Scholars

Aanzan Sachdeva

Vassar College

Abigail Ali University of Richmond



Abigail Fisk Ohio State University "Design and Synthesis of Novel Quinone Methide Precursors for the Treatment of Organophosphorus Poisoning"

Abigail Tramell Vassar College

Adam Jackiw University of Michigan

Adriahna Blackburn Oklahoma State University

Alexa Kuyvenhoven North Carolina State University

Alexandra Turvey Pomona College

Amanda Nguyen University of California, Los Angeles

Andres Rodriguez Cardenas Trinity College

Andrew Opincar University of Maryland, Baltimore Cty. **Andy Tong** University of Southern California

Anthony Kelly North Carolina State University

Arya Patel Tufts University

Auden Wilson University of Richmond

2023 Awardee Institutions

California State University, East Bay Fort Lewis College Louisiana State University Miami University Mount Holyoke College Oklahoma State University Pomona College Smith College Smith College University of California, Irvine University of Michigan University of Richmond

Washington University in St. Louis



2023 Beckman Scholars—continued

Aurora de Tagyos

University of California, Santa Barbara

Bella Liffick

Ft. Lewis College



Bryan Forrest Hope College "Exploring Novel Directing Groups for Rhodium-Catalyzed Decarbonylation"

Caleb Brzezinski Hope College

Cameron St.Onge California State University, San Marcos

Camilla Guel Vanderbilt University

Carly Slough Furman University

Cecelia Meinking Miami University



Chaitra Moolaveesala University of Michigan "Genome Engineering of Clinical E. coli Strains to Understand Biofilm Development " **Charu Balamurugan** Vanderbilt University

Cora Youngs Virginia Polytechnic Institute

Cynthia Chang Washington University, St. Louis



Daniela Becerril Wellesley College "Development of Fluorescence Anisotropy Sensors Measuring Caspase Activity"

Derek Chien University of Rochester

Douglas Swango University of Arizona

Dykia Williams Louisiana State University

Emily Boyt College of William and Mary

Emma Whittemore Smith College



2023 Beckman Scholars—continued



Eric Talbott SUNY Binghamton "Unravelling Cyanoarene Radical Anion Stability for Improved a-aminoarylation Photoredox Reactions"

Erin Desmond Mount Holyoke College

Eva Scholz-Carlson Barnard College

Eyananda Ahmed Smith College



Fiddi Hilmi SUNY Binghamton "Analysis of the biofilm activity of peptidomimetic polyurethanes"

Hariharan Kannan Ohio State University

Helen Moniz Haverford College

Hena Kachroo University of Kentucky

Illia Kawash-Cooper Mount Holyoke College

Jessy Gonzalez

University of California, Santa Barbara



Jihae Jang University of Maryland, Baltimore County "Determining the Role of AZIN1 in Prostate Cancer Metastasis in a Mouse Model"

John Georgiades Washington University, St. Louis

Jonathan Le University of California, Irvine

Joseph Madell Macalester College

Joshua Lamantia Indiana University (IUPUI)

Jujhar Singh Indiana University (IUPUI)

Kaitlyn Brock University of Kentucky

Kennedy Barnes Wellesley College

Kevin Nguyen Chapman University

Kimya Firoozan Barnard College

Lexi Cheramie Louisiana State University

Lilly Pubillones Trinity College



2023 Beckman Scholars—continued

Lindsay Diab Tufts University

Litzy Juarez Serrano California State University, East Bay

Margaret Hoare University of Rochester

Marvin Center Georgia State University

Nicholas Cipolla Trinity University

Nina Parvin Oklahoma State University

Olivia Fernflores University of Arizona

Paul Rosa Chapman University



Richard Shen University of Southern California "Investigating CRISPR-Cas9 Conformational Activation Using Site-Directed Spin Labeling"

Robert "Ben" Rose University of California, Irvine

Rowan Lawrence Georgia State University

Samantha Fehlis

Texas A & M University



Santiago Serrano Pomona College "Therapeutic Effects of Neurogenesis on Alzheimer's Disease "

Savannah Jones Ft. Lewis College

Sean Bryson Miami University

Tiana Bishop California State University, East Bay

Helen Xia University of Richmond

Trevor Martinez Texas A & M University

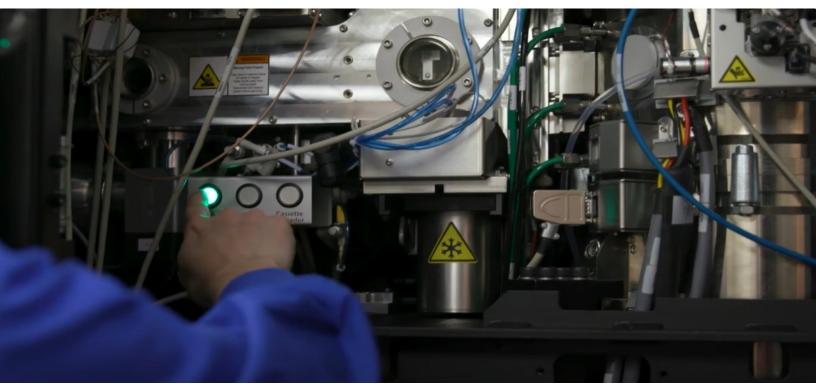
Tyler Moore Virginia Polytechnic Institute

Yigit Simsek College of William and Mary

Zade Alafranji Macalester College



INSTRUMENTS



Above: Inside the CryoEM, courtesy of Johns Hopkins University.

V. Instrumentation Grants

In 2017, the Foundation made a \$12.5M investment in the purchase of Cryogenic Electron Microscopy equipment to establish 5 "Beckman CryoEM Centers" at U.S. Institutions. Research Following the installation and initial operational readiness tests for the instruments, they have been running virtually non-stop over the subsequent five years of the Foundation's program awards.

Right: Four videos from the new Beckman CryoEM Centers that showcase the impact of the new equipment and the wide variety of research problems that the Centers are tackling with these new capabilities. University of Pennsylvania: https://youtu.be/IMLyFntApes Pl: Vera Moiseenkova-Bell

University of Utah: https://youtu.be/hyRax2cmfcA PI: Wes Sundquist

Johns Hopkins University: https://youtu.be/hzgmRSBs3BY Pl: James Berger

Massachusetts Institute of Technology: https://youtu.be/ck4P21IJ9UM PI: Thomas Schwartz



Above: Participants in the "Girls in STEM" program at Los Alamitos Youth Center display science experiments.

VI. Local Community Support

The Foundation is proud to support innovative STEM/STEAM activities in the local community we call home, including:

Beckman Arts & Science Family Day

Festival-style science entertainment at Segerstrom Center for the Arts

Beckman High School

Science Olympiad Team materials and invitational fees

Chapman University Foundation

"Wescombe STEM Scholarship" endowment for student scholarships

Irvine Public Schools Foundation

3rd Annual Leaders in Education Forum

J.F. Shea Therapeutic Riding Center "Fosheim Innovation Fund" endowment for science programs

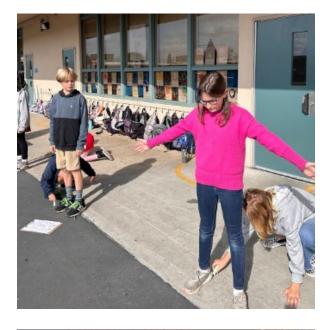
Kids@Science

Local Orange County STEM teacher training initiative and science kits

Los Alamitos Youth Center Girls in STEM workshops for 2nd-6th graders

MIND Research Institute Curriculum development for ST Math Core

OC Science and Engineering Fair Special awards and support





Left column (top down): Kids@Science supports local Orange County teachers by providing them with professional development in STEM, opportunities to network with science advocates, and hands-on science kits with supplies for their classrooms. Here, students participate in STEM-related a OCSEF recognizes the Arnold and Mabel Beckman Foundation-Chapman special award recipients from the science fair during a ceremony held at Chapman University.

Right column (top down): Students take part in a classroom activity utilizing MIND Research Institute's ST Math program. Families explore booths with hands-on STEM activities during the Beckman Arts & Science Family Festival at Segerstrom Center for the Arts in Costa Mesa, California.





Above: Beckman Scholars Below (left): Attendees during dinner and a poster session





VII. Annual Beckman Symposium

The annual Beckman Symposium brings together the over 275 grantees from our programs and Foundation leadership, including members of the Board of Directors, Scientific Advisory Council, Executive Committees, and Beckman Institutes.

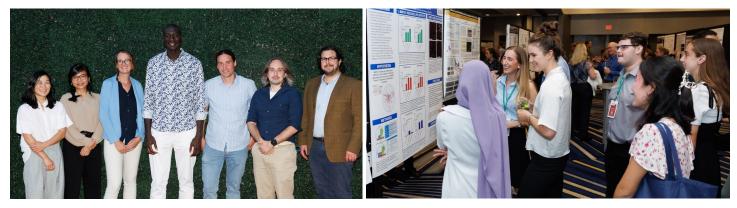
The event features researchers from varied backgrounds, career stages, disciplines, and institutions sharing their latest research findings in the form of oral and poster presentations, networking during group meals, and participating in career guidance workshops led by invited experts. After the scientific sessions conclude, the participants relax with colleagues and enjoy lawn games and social time.

2023 Beckman Symposium was attended by:

36 AOB Postdoctoral Fellows 134 Beckman Scholars 37 Beckman Young Investigators 12 Executive Committee Members 7 Beckman Scholar Mentors 5 OC Beckman Legacy Awardees 33 Other Guests



Above: Technical talk audience



Above: 2023 BYIs and Poster presenters at the Beckman Symposium



Above: Post Dinner Fun



Above: Groundbreaking ceremony for the Beckman Institute at University of Illinois, Urbana-Champaign.

VIII. Beckman Institutes and Centers

In 1978, Dr. and Mrs. Beckman began their philanthropic giving by founding five basic science research institutes and centers at universities leading that had been influential in their own lives. Each of the research Institutes and Centers have a mission to promote novel interdisciplinary science programs, and provide access to leading instrumentation facilities. In addition to the research Institutes, Dr. and Mrs. Beckman also established the Beckman Center of the National Academies the west coast as headquarters for National Academy activities and scientific conferences.

The Beckman Foundation continues the commitment to these Institutes and Centers through an annual Director's Fund grant, which may be used at the sole discretion of the Directors.



Dr. John Carpten, Director Beckman Institute at City of Hope



Beckman Research Institute at Caltech

Director: Dr. Marianne Bronner Pasadena, CA



Beckman Institute for Advanced Science and Technology at the University of Illinois, Urbana-Champaign

Interim Director: Dr. Cathy Murphy Urbana, IL



Beckman Research Institute at City of Hope

Director: Dr. John Carpten Duarte, CA



Beckman Laser Institute & Medical Clinic at University of California, Irvine

Acting Director. Dr. Bernard Choi Irvine, CA



Beckman Center for Molecular & Genetic Medicine at Stanford University

Director: Dr. Lucy Shapiro Stanford, CA



Above: 2022 Beckman Symposium at Rutgers University Presentation by 2004 Beckman Scholar and 2021 BYI Tania Lupoli, PhD

IX. Beckman Speaker & Conference Support

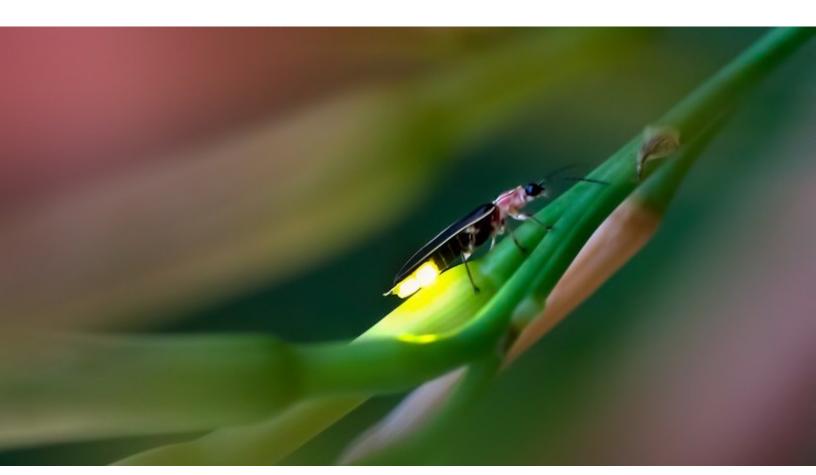
The Arnold and Mabel Beckman Foundation Speaker and Conference Support Fund is open to all current Foundation grant awardees, specifically from the BSP, AOB Postdoc, or BYI programs. Current Beckman awardees organizing or hosting a seminar of conference at their institution can invite a member of the Beckman Family to be a speaker and submit an application to this program for funding up to \$3,000 per request, in support of, but not limited to: travel, Speaker room rental fees. reception costs, food, beverages, printed materials, etc.

The Foundation chooses a limited number of Speaker and Conference events based on their relevance to the mission of the program and Foundation as a whole, campus, scientific and community impact, and the scope of appeal of the event.

In 2023, Speaker and Conference support was provided to:

Abhishek Kumar, PhD Marine Biological Laboratory

Jill Alty, PhD Massachusetts Institute of Technology



Above: 2016 BYI Jing-Ke Weng investigates harnessing the light production pathway of fireflies for other imaging and power applications.

X. Financial Report

The Foundation's endowment net assets increased by \$10 million in 2023 from the unrealized gains on investments, offset by the increase in future grant commitments mostly to the Research Corporation for Science Advancement, and a reduction of cash on the balance sheet. During the past Foundation focused year, the on diversifying its investments within new, streamlined asset classes to achieve higher returns while lowering portfolio risk. Further, the Foundation updated its benchmarks evaluate relative used to investment performance. The Foundation utilized its cash more efficiently by funding payments from source accounts and implementing a

shortened approval process, thereby minimizing cash transfers and bank float.

Lastly, the Foundation is working with fund managers to determine the effects of paying unrelated business income tax on the Foundation's 5-year distribution projections and on investment performance.

Fiscal Year Financial Highlights: (Sept. '22-Aug. '23)

Total expenses & grant disbursements: \$39,900,000

After our net investment income, expenses, and accrual adjustments, the increase in net assets was \$10,272,000.