Arnold and Mabel Beckman Foundation
2019 Annual Report

SUPPORTING YOUNG SCIENTISTS TODAY
FOR TOMORROW'S BREAKTHROUGH DISCOVERIES

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On the cover: 2017 AOB Postdoctoral Fellow Danielle Mai, PhD, presents her research during the annual Beckman Symposium.
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Our Mission

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.

2019 At-A-Glance

New Program Awardees (#)

- 57
- 10
- 15

Foundation Expenses ($)

- 16,166,000
- 2,167,000
- 9,840,000
- 1,036,000

40 Years of Impact (1978-2018):
$700+ Million in Research Support

Special Gifts $145M
Program Grants $174M
Beckman Institutes $405M
The Future Looks Bright
A Message from the Executive Director

Dear “Beckman Family” and Friends,

We hope you enjoy this inaugural annual report of the Arnold and Mabel Beckman Foundation! Last year we completed the 40th anniversary year of the Foundation, with several special events designed to reflect on the impact and legacy of the Beckmans in supporting the next generation of scientists through their philanthropy. We didn’t rest long after all the celebrations, though, and 2019 was again a busy year.

In addition to selecting our new classes of Beckman Young Investigators and Beckman Scholars, we also welcomed our first class of Arnold O. Beckman Postdoctoral Fellows in Chemical Sciences. In the Spring, we hosted an “Instrumentation Needs” meeting, gathering a diverse group of experts to discuss how the Foundation could best make a broad research impact through instrumentation grants, which led to our release of a one-time grant opportunity for the Advanced Light Sheet Microscopy and Data Science program. Finally, we also launched our new Orange County Beckman Legacy Award program—an opportunity for local high schoolers to build their own spectrophotometer and conduct lab activities for a chance to win a college scholarship valued at up to $16,000. We look forward to meeting the first awardees from this program in early 2020!

On top of everything else, we designed and launched a new website to highlight our grant programs and award recipients—please take a moment to look through the newly designed content and images from our awardees.

We remain laser focused on the Foundation’s goal of supporting young scientists today for tomorrow’s breakthrough discoveries, directing our energy and efforts to the young minds interested in science who may one day become the next Arnold Beckmans of the world.

It’s an exciting time to be a part of Arnold and Mabel Beckman Foundation. From our local high school students to our BYIs, Postdocs and Scholars across the country, the future indeed looks bright!

Anne Hultgren, PhD
Executive Director
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
Mr. William May (Chairman)
Mr. Gary Wescombe (Treasurer)
Mrs. Jacqueline Dorrance-Tomlinson (Secretary)
Mr. Jon Fosheim
Dr. Jeffrey Johnston, PhD
Dr. Lawrence Kline, MD
Dr. Andrew Lyon, PhD
Mr. Steven Pizula
Mrs. Lynn Rahn
Mr. Peter Simon
Dr. Deborah Wuttke, 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 2019 Executive Committee members:

**Young Investigators**
- Prof. Susana Cohen-Cory, PhD
- Prof. Shiv Halasyamani, PhD
- Prof. Ke Hu, PhD
- Prof. Vassiliy Lubchenko, PhD

**Postdoctoral Fellows**
- Prof. Carolyn Anderson, PhD
- Prof. David Forbes, PhD
- Prof. Philip LeDuc, PhD
- Prof. Jill Millstone, PhD

**Scholars**
- Prof. Jeff Brodsky, PhD
- Prof. Craig Gatto, PhD
- Prof. Laura Hunsicker-Wang, PhD
- Prof. Carol Parish, PhD

*Served in this role for part of 2019*
Awardee Highlights from the Past Year

Kang-Kuen Ni, PhD
2015 Beckman Young Investigator
Published in Science: “An Optical Tweezer Array of Ultracold Molecules” (cover)

Krzysztof Palczewski, PhD
2014 Beckman-Argyros Awardee
Elected to the National Academy of Medicine

Neville Bethel, PhD
2019 AOB Postdoctoral Fellow
Named Hanna H. Gray Fellow by HHMI

Erin Fish
2018 Beckman Scholar
Received Goldwater Scholarship* and Earned Top Poster Honors from Protein Society

Alex Shalek, PhD
2015 Beckman Young Investigator
Named Institute Member of the Broad Institute

Chang Liu, PhD
2015 Beckman Young Investigator
Received 2019 ACS Synthetic Biology Young Innovator Award

*Beckman Scholars Christina Beck, Alicia Bostwick, Andrea Cheng, Ariel Gale, Marlene Lawston, Ella Mullikin, Charlotte Mineo, and Grace Solini also received Goldwater Scholarships.
Elena Schroeter, PhD  
2017 AOB Postdoctoral Fellow  
Published in Journal of Proteome Research:  
“A Comparison of Common Mass Spectrometry Approaches for Paleoproteomics”

Megan Thielges, PhD & Darren Lipomi, PhD  
2001 & 2003 Beckman Scholars  
Received Presidential Early Career Award for Scientists and Engineers

Elena Gracheva, PhD  
2015 & 2018 Beckman Young Investigators  
Received NSF Career Award

Eric Beltrami  
2018 Beckman Scholar  
Published in Nature Neuroscience:  
“Single-cell Transcriptomic Analysis of the Lateral Hypothalamic Area Reveals Molecularly Distinct Populations of Inhibitory and Excitatory Neurons”, and received Margaret F. Ertman Award for Outstanding Undergraduate Research in Biology

Ariel Furst, PhD  
2016 AOB Postdoctoral Fellow  
Published in Current Opinion Electrochemistry:  
“Toward Multimarker and Functional Assays from Crude Cell Lysates: Controlling Spacing and Signal Amplification in DNA-CT-based Bioelectrochemical Devices” (cover)
I. 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, high-risk, 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.

2019 BYI National Recognition:

Elected to the National Academy of Sciences
Arlene Sharp, Yang Dan

Presidential Early Career Awards
Erik Grumstrup, Prashant Jain

NSF Career Awards
Genia Kozorovitskiy, Elena Gracheva, Xiaoji Xu

2019 BYI Program Stats:

300+ Applicants
10 Researchers Selected for Awards, Representing 9 Institutions
$6 Million in Funding for ‘15-’19 Awardees

Above: Adipocytes differentiates from 3T3-L1 cells were fixed and stained with Oil Red O for lipid droplets and counterstained with hematoxylin for nuclei. Image was acquired using Nikon Ti-E microscope at 200x magnification. Photo by Xiaojing Su, in the lab of 2018 BYI Ashleigh Theberge, PhD.
2019 Beckman Young Investigator Awardees

Keriann Backus, PhD
University of California, Los Angeles

Chenfeng Ke, PhD
Dartmouth College

Wesley Legant, PhD
University of North Carolina, Chapel Hill
“Intelligent Microscopes to Observe and Interact with Dynamic Biological Specimens”

Frank Leibfarth, PhD
University of North Carolina, Chapel Hill

Jarad Mason, PhD
Harvard University

Jia Niu, PhD
Boston College
“A General Strategy for the Synthesis of Precision Sustainable Polymers with Main-Chain Functionalities from Renewable Resources”

Leslie Schoop, PhD
Princeton University

Kimberly See, PhD
California Institute of Technology
“Divalent Ion Conductivity in the Solid-State”

Kirk Wangensteen, MD/PhD
University of Pennsylvania

Brad Zuchero, PhD
Stanford University
“Elucidating New Roles of Myelin in Plasticity, Learning, and Disease”
II. 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 2 years for salary, fringe benefits, and research expenditures; instrumentation fellowships will receive additional one-time $100,000 for material/development costs.

2019 Program Highlights:
After a pause in 2018, the Postdoctoral Fellows Program was restructured and relaunched in 2019, with a new focus on chemistry and chemical instrumentation.

2019 Postdoc Program Stats:
45 Applicants
15 Researchers Selected for Awards
11 Institutions Represented
$4 Million in Funding for ’17-’19 Awardees
2019 Arnold O. Beckman Postdoctoral Fellows

Neville Bethel, PhD
University of Washington

James Bour, PhD
Massachusetts Institute of Technology

Quinn Burlingame, PhD
Princeton University

Alice Chang, PhD
University of Minnesota, Twin Cities
“Tough, Sustainable Plastics via Graft Block Polymer Design”

Kangway Chuang, PhD
University of California, San Francisco

Stewart Mallory, PhD
California Institute of Technology

Hossein Robatjazi, PhD
University of California, Santa Barbara
“Atomistic Insights into Surface Phenomena in Heterogeneous Catalysis”

Sam Sanders, PhD
Harvard University

Alexander Schuppe, PhD
Massachusetts Institute of Technology

Adam Slavney, PhD
Harvard University

Patrick Smith, PhD
Massachusetts Institute of Technology

Benjamin Snyder, PhD
University of California, Berkeley

Dayne Swearer, PhD
Stanford University

Julie Fenton, PhD
Northwestern University
“Macroyclic Nanotubes as a Platform for Functional Membranes and Materials Discovery”

Miguel Gonzalez, PhD
Harvard University
III. Beckman Scholars Program

The Beckman Scholars Program provides an in-depth, sustained research 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 team over 15 continuous months of research, in conjunction with the Annual Beckman Symposium, offers an academically stimulating and unique educational experience.

The award spans three years with four to six student/mentor pairs named per institution; applications submitted by invitation only.

BSP National Recognition in 2019:

2019 Goldwater Scholars
Christina Beck, Alicia Bostwick, Andrea Cheng, Erin Fish, Ariel Gale, Marlene Lawston, Charlotte Mineo, Ella Mullikin, Grace Solini

2019 BSP Program Stats:
13 Institutions Selected for 2019 Awards
57 Scholar/Mentor Teams began their Research Projects
$1.7 Million in Funding for ‘17-’19 Awardees

Above: 2018 Beckman Scholar Karina Targos, BA, creates a web-like material made of cubic siloxanes monomers decorated with an aryl and ester functional group on each corner, an example using organic chemistry and catalysts to make new functionalized nanomaterials.
2019 Beckman Scholars

Sahar Amin
San Francisco State University

Christina Beck
Pomona College

Erik Bidstrup
Northwestern University

Nicole Carrillo-Vallejo
College of William and Mary

Alicia Caughman
Georgia Institute of Technology

Ziyan Chen
College of William and Mary

Ryan Clark
University of Virginia

Julianna Cresti
Villanova University

Gillen Curren
Villanova University

Jasmine Esparza
University of California, Los Angeles

Aidan Fike
Tufts University

Taylor Fish
Brigham Young University

Lucas Frye
University of Virginia

2019 Awardee Institutions
Calvin University
Clemson University
Colgate University
Georgia Institute of Technology
Pennsylvania State University
San Francisco State University
Santa Clara University
University of California, Los Angeles
University of Chicago
University of Connecticut
University of Kansas
University of Virginia
Whitman College

Shaoni Dasgupta
Clemson University
“The Role of Carnitine Acetyltransferases in the Virulence of the Fungus Cryptococcus Neoformans”

Alexis Davison
Pennsylvania State University
2019 Beckman Scholars—continued

Ariel Gale
Furman University

Grayson Hamrick
Haverford College

Xiaoyi Sean Hu
Northwestern University

Kathleen Imbach
Georgia Institute of Technology

Angelica Lang
University of Kansas

Molly Madden
University of Colorado, Boulder

Kaitlin Malley
Boston College

Vennela Mannava
University of Chicago

Nathan Matzko
Clemson University

Patrick McGeoghegan
Boston College

Silas Miller
Whitman College

Alexandra Moore
Whitman College

Ella Mullikin
Wellesley College

Jett Murray
University of Idaho

Audrey Muscato
Bowdoin College

Emi Nakahara
University of California, Los Angeles

Kartik Nath
Union College

Benjamin Neubert
University of Virginia

Kevin Pataroque
Case Western Reserve University

Gwendolyn Pyeatt
Boston University

Ryan Rahman
Texas A&M University

Jeffrey Rasmussen
University of Connecticut
2019 Beckman Scholars—continued

Kristen Read
Brigham Young University

Megan Rodriguez
University of Chicago

Alice Sardarian
Barnard College

Bradley Scholten
Calvin University
“The Effects of Human Technology on Behavioral and Physiological Stress in Tachycineta bicolor and Danio rerio”

Sarah Shnayder
Tufts University

Ekaterina Skaritanov
University of Connecticut

Jonah Stiel
University of Kansas

Jamison Takashima
University of Arizona

Isabel Thompson
Grand Valley State University

Peyton Tierney
Boston University

Brooke Van Wyk
Hope College

Ana Verma
Amherst College

Elizabeth Wade
University of San Diego

Jacob Watts
Colgate University

Catherine Weibel
University of Arizona

Shoshana Williams
Barnard College

Katherine Xia
Santa Clara University

Katherine Yan
Case Western Reserve University

Taylor Yount
Pennsylvania State University
“Small-molecule Signaling between Bacterial Populations within a Host”
IV. Beckman-Argyros Award in Vision Research

The Beckman-Argyros Award in Vision Research rewards one individual who has made, and is continuing to make, significant transformative breakthroughs in vision research; including those whose contributions are to science in general, or through the development of an innovative technology or fundamental scientific breakthrough have been applied to, aided and/or improved the vision sciences. One award of $500,000, consisting of the prize and grant, is presented annually along with a commemorative medallion.

2019 Program Highlight:

The final selection for this program was made in 2019.

Since 2014, the Program has provided a total investment of $3 Million to support innovative research in the vision sciences.

2019 Awardee:

Dr. King-Wai Yau, PhD
Johns Hopkins School of Medicine
Advances in instrumentation and methods have revolutionized applications of cryogenic electron microscopy (Cryo-EM) to determine atomic structures of biological samples that are currently beyond the reach of other structural biology methods. However, the expense of the instrumentation is a major roadblock to increasing access to this technology. In 2016, the Foundation provided 5 grants of $2.5M each that could be used for purchase costs of new Cryo-EM instrumentation, support for a junior faculty hire in structural biology, and operational expenses.

The following 5 institutions were selected for awards: Johns Hopkins University School of Medicine, Massachusetts Institute of Technology, University of Pennsylvania, University of Utah, and University of Washington.

2019 Program Highlight:
This year marked the official opening of the final two CryoEM Centers at University of Pennsylvania and Johns Hopkins University, with all five Centers now operational and collecting data.
The annual Beckman Symposium brings together the nearly 300 grantees from our programs and Foundation leadership, including members of the Board of Directors, Scientific Advisory Council, Executive Committees, and Beckman Institutes.

The 3-day 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 the colleagues and enjoy a variety of competitive lawn games.

“The exciting thing was that all of the stories being told in talks and posters were open and honest about the fact that no matter what problem they were tackling, they weren’t there YET. Nobody felt compelled to tell a ‘complete story.’ The presentations were all wonderful snapshots of where the research stood, while presenting the sometimes daunting path forward to true understanding of the system under investigation.”

— Dr. Andrew Lyon, Board of Directors
Board Chair William May congratulates award winners Dr. Kent Hill, Dr. King-Wai Yau, Dr. Gary Firestone and Dr. Carolyn Anderson; BYI Executive Committee Member Dr. Vas Lubchenko relaxes with some friendly foosball competition, and Professor Brian Goess hosts a round of Beckman “Jeopardy.” 

Left column (top down): BSP Stephanie Song delivers her poster presentation, guests take part in after-dinner ping pong. Corey Sandler, OC Event Photos
VII. Beckman Institutes and Centers

In 1978, Dr. and Mrs. Beckman began their philanthropic giving by founding five basic science research institutes and centers at leading universities 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 as the west coast 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.

Welcome to Dr. Marianne Bronner, Director of the Beckman Research Institute at Caltech
Beckman Research Institute at Caltech
Director: Dr. Marianne Bronner
Pasadena, CA

Beckman Laser Institute & Medical Clinic at University of California, Irvine
Director: Dr. Matthew Brenner (interim)
Irvine, CA

Beckman Center for Molecular & Genetic Medicine at Stanford University
Director: Dr. Lucy Shapiro
Stanford, CA

Beckman Research Institute at City of Hope
Director: Dr. Steven Rosen
Duarte, CA

Beckman Institute for Advanced Science and Technology at the University of Illinois, Urbana-Champaign
Director: Dr. Jeffrey Moore
Urbana, IL

Beckman Institute for Advanced Science and Technology at the University of Illinois, Urbana-Champaign
VIII. Local Community Support

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

**Kids@Science**
STEM teacher training initiative

**Irvine Public Schools Foundation**
CubeSat high school program

**Beckman Arts & Science Family Day**
Festival-style science entertainment at the Segerstrom Center

**OC Science and Engineering Fair**
Special awards and support

**Chapman University Keck Center for Science and Technology**
Capital campaign

**Richard Nixon Presidential Library and Museum**
Apollo 11: One Giant Leap for Mankind Exhibit

*Above: Teacher kits from 2019 Physical and Earth Sciences classes, offered by Kids@Science. The Foundation donated $600,000 to extend support for the initiative for an additional three years.*
Left column (top down): AMBF staff member Tiana Godges leads a pH activity with local kids; University High student Jaeho Lee presents his research poster; Center: BYI Dr. Chang Liu kicks off the OC Beckman Legacy Award reception.

Right column (top down): CubeSat team members work on their satellite; Dr. Anne Hultgren joins families at the Beckman Arts & Science Family Day; Dean Andrew Lyon recognizes Beckman-Chapman awardees from OCSEF.
The Arnold and Mabel Beckman Foundation is proud to announce the launch for the Orange County Beckman Legacy Award, a college scholarship competition with awards up to $16,000. Participating students work with a science teacher mentor at their school to complete a project build inspired by the revolutionary tools of Dr. Arnold O. Beckman, as well as perform experiments, create their own innovative experiment, report on experiment findings, and answer essay-style questions. Submitted projects are evaluated by the Foundation using a panel of outside experts to select the award winners.

The following schools have students participating in the pilot year of this program:

- Northwood High School
- University High School
- Arnold O. Beckman High School

Above: Lead halide perovskite. Image credit: Erik Grumstrup
X. Beckman Speaker & Conference Support

The Arnold and Mabel Beckman Foundation Speaker and Conference Support Program is open to all current Foundation grant awardees, specifically from the BSP, AOB Postdoc, BYI, or Beckman-Argyros Vision Research programs. Current Beckman awardees organizing or hosting a seminar or 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: Speaker travel, 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 2019, Speaker and Conference support was provided to:

Prof. Shiv Halasyamani, PhD  
University of Houston

Prof. Bo Wang, PhD  
Stanford University
XI. Financial Report

In accordance with our Founders’ wishes to ‘not spend money to give money away,’ the Foundation remains focused on finding operational efficiencies and technology improvements without adding long-term operating costs. To this end, the Foundation implemented the nonprofit Salesforce edition for tracking awardees and grant deliverables, and a new grants application system to streamline collection of award documents. In 2019, we benchmarked our operating expenses as a percent of grant distributions, with the Beckman Foundation at 7% compared to the average of 24% for other similar private foundations.

During 2019, the Foundation announced a new Light Sheet Instrumentation and Data Science program, a one-time grant opportunity for the procurement of advanced light-sheet capabilities.

Fiscal Year (Sept. ‘18-Aug. ‘19) Financial Highlights:

Total expenses and disbursements: $29,209,000

After our expenses, investment income, amounts set aside, and net accruals, the reduction in net assets was $15,124,000.