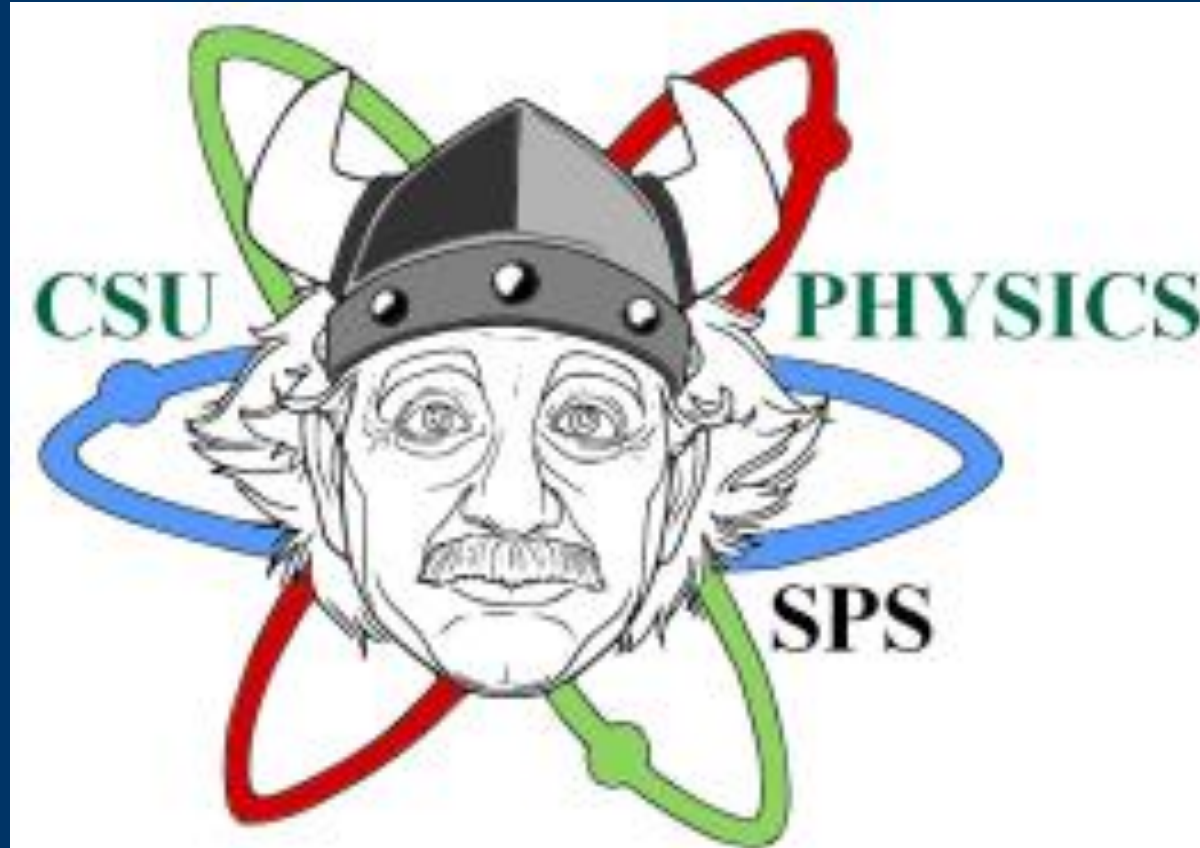




Preparing for STEM careers through an engaged physics education: academics, undergraduate research, strong student community, public outreach & teaching

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Introduction to the Department

The CSU Physics Department provides a high quality, affordable, and flexible education. Alumni of the department are highly successful in obtaining employment at leading institutions (e.g. NASA, Intel, CERN, Cleveland Clinic, UH, GE Aviation, Philips) and prestigious Ph.D. programs (e.g. John Hopkins, Carnegie Mellon, Caltech, U Chicago, Penn State).

The Physics department provides extensive opportunities for student engagement. These include faculty coordinated undergraduate research, involvement in public outreach and teaching activities at CSU, and strong student community centered around a nationally recognized by the American Institute of Physics (AIP) chapter of the Society of Physics Students (SPS). SPS provides student community as well as leadership, outreach, networking and service opportunities for interested students.

Department Highlights:

- Degree offerings: Minor; Bachelor of Arts (BA); Bachelor of Science (BS and BS Honors); Master of Science (two professional tracks: Optics & Materials and Applied Physics); 4+1 BS/MS Accelerated Program.
- Highest number of physics bachelor degrees awarded among all the public universities in Northeast Ohio (AIP Statistics – 2020 Data).
- No.3 in Ohio for the number of Physics MS degrees awarded (2018–20)
- Since 2011: 3 University Valedictorians; 4 College Valedictorians (3 COSHP & 1 WCOE); 3 SPS Leadership Scholarships; 2 NSF Graduate Research Fellowships; YWCA Dr. Jennie S. Hwang Award (a first for a CSU student), and a Distinguished Alumni Award were Physics majors.
- **Undergraduate Research:** a) Sought and secured significant external and internal funding for research projects that involve undergraduates; b) strong emphasis on professionally presented and published undergraduate research; c) Host of a NSF's Research Experience for Undergraduates (REU) site at CSU since 2017.
- **Strong Student Community:** The community is formed around a local SPS chapter that engages in bi-monthly on-campus events, off-campus research tours, public outreach, and student professional travel.
- **Undergraduate Teaching:** strong juniors and seniors are often invited to assist in tutoring and lab teaching for introductory courses.
- One of the most efficient departments at CSU in terms of resource management/cost per credit hour.

Undergraduate Research

CSU Physics hosts a strong undergraduate research program:

- Since 2011, more than **30 peer reviewed publications** listing CSU physics students as coauthors, and 8 publications currently at different stages in the publication process.
- Since 2011, more than **135 presentations (including 7 award winning)** at national, regional, international physics conferences by CSU undergraduates on research done at the Physics Department.
- Since 2011, More than **110 CSU undergraduates** have been involved in undergraduate research supported by external and internal funding.
- Since 2016, faculty external funding involving undergraduates included grants from Research Corp., DOE, NSF, NIH totaling about **\$4.7M**.
- Since 2015, faculty internal funding that supported undergrads included **38 Undergraduate Summer Research Awards (USRA)**, **4 Faculty Research & Development Awards (FRD)**, and a **MIRP Award** (for a total of ~\$330k)

CSU Physics has hosted an NSF's Research Experience for Undergraduates (REU) site (\$312k). This is a prestigious recognition of the dedication of Physics/CSU to involve undergraduates in research. The REU brought 26 undergraduates from 10 different states and 18 colleges. It led to 9 peer reviewed publications, 2 peer-reviewed abstracts, a patent application, 5 manuscripts in preparation, and more than **88 research presentations**. Two of students won NSF's Graduate Research Fellowship (GRFP).

Summer 2019 NSF REU at CLEVELAND STATE UNIVERSITY: Synthesis, Assembly, and Characterization of Soft Matter

The departments of Physics and Chemical & Biomedical Engineering at Cleveland State University invite you to join us in conducting cutting edge soft matter research. Build your research and scientific communication skills in a supportive environment by participating in our Research Experience for Undergraduates (REU) program, sponsored by the National Science Foundation (NSF).

Program Dates: June 3 – August 9, 2019

Projects: electron imaging of soft matter systems; design and characterization of protein-based materials; volume phase transition in polymer microgels; Janus particles; assembly of anisotropic nanoparticles; imaging of polymers on surfaces; microfluidic channels and mixers; optical study of cellular micromotility in fluid flow.

Support: \$5000 stipend (for 10 weeks; housing provided at no charge); up to \$500 travel funds to CSU; \$500 conference travel funds after completion of REU.

Eligibility: current undergraduate students who are US citizens and permanent residents. Underrepresented minorities and women are encouraged to apply.

Priority deadline February 15, 2019.
(Applications submitted by February 28, 2019 will be considered)

Contact: Dr. Kiril Streletzky and Dr. Jessica Bickel, softmatterre@csuohio.edu
Website: <http://www.csuohio.edu/sciences/physics/soft-matter-reu>

Physics Majors (BS and BA) at CSU

- CSU Physics graduates **8.7 majors** (18–21 and 19–22) **per year** which compares favorably with the national average for the departments in the US where MS Physics is the highest degree.
- Based on the latest available statistics, the relative number of physics and STEM degrees, respectively, awarded at CSU are **(0.34 %, 2.1 %)**. This is **higher than many Ohio institutions**, i.e. U. of Akron (0.16 %, 0.81%), Kent State U. (0.16 %, 1.5 %), and Youngstown State U. (0.17 %, 0.86 %). In fact, the only other state institutions with higher percentages are Miami of Ohio and OSU.

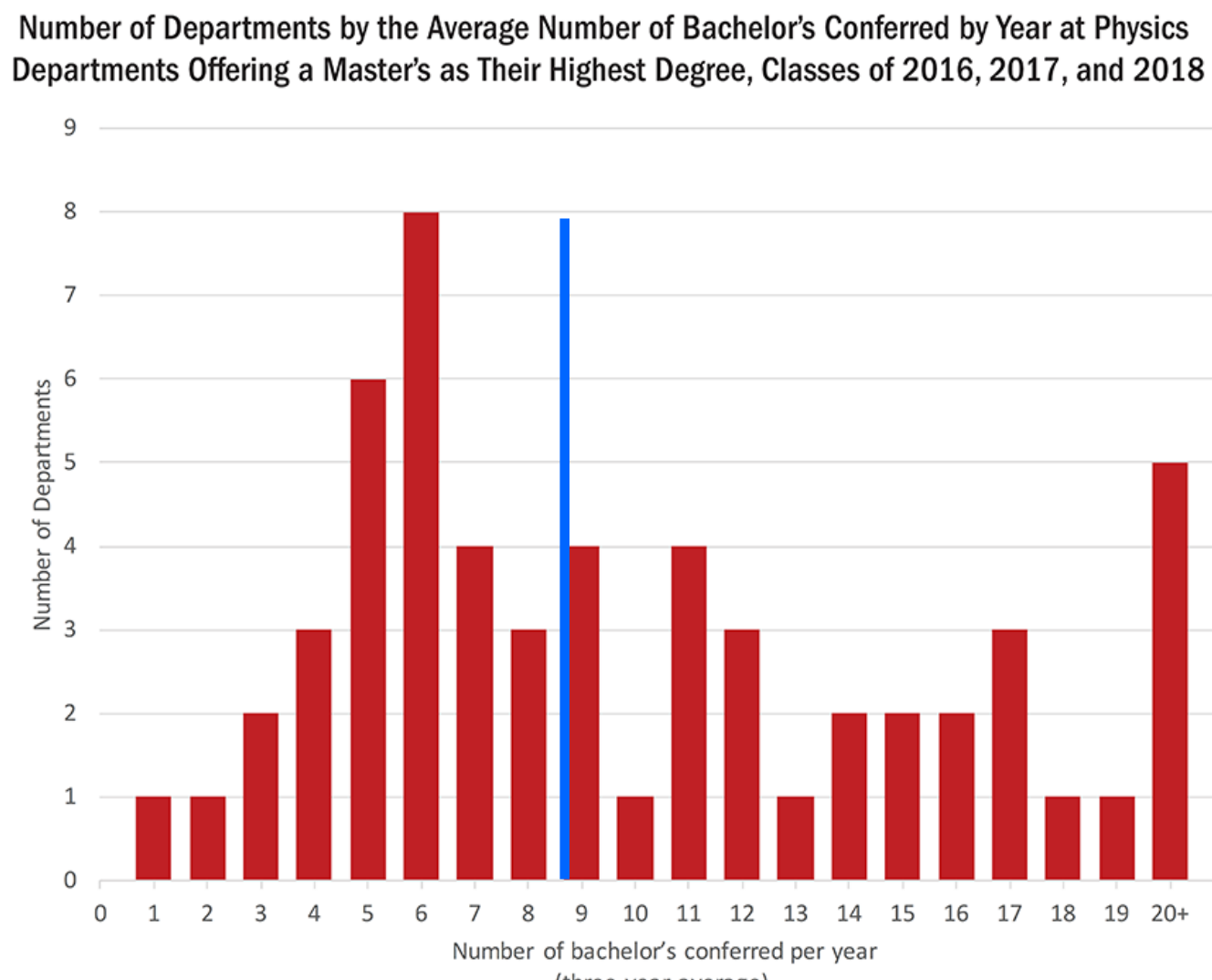
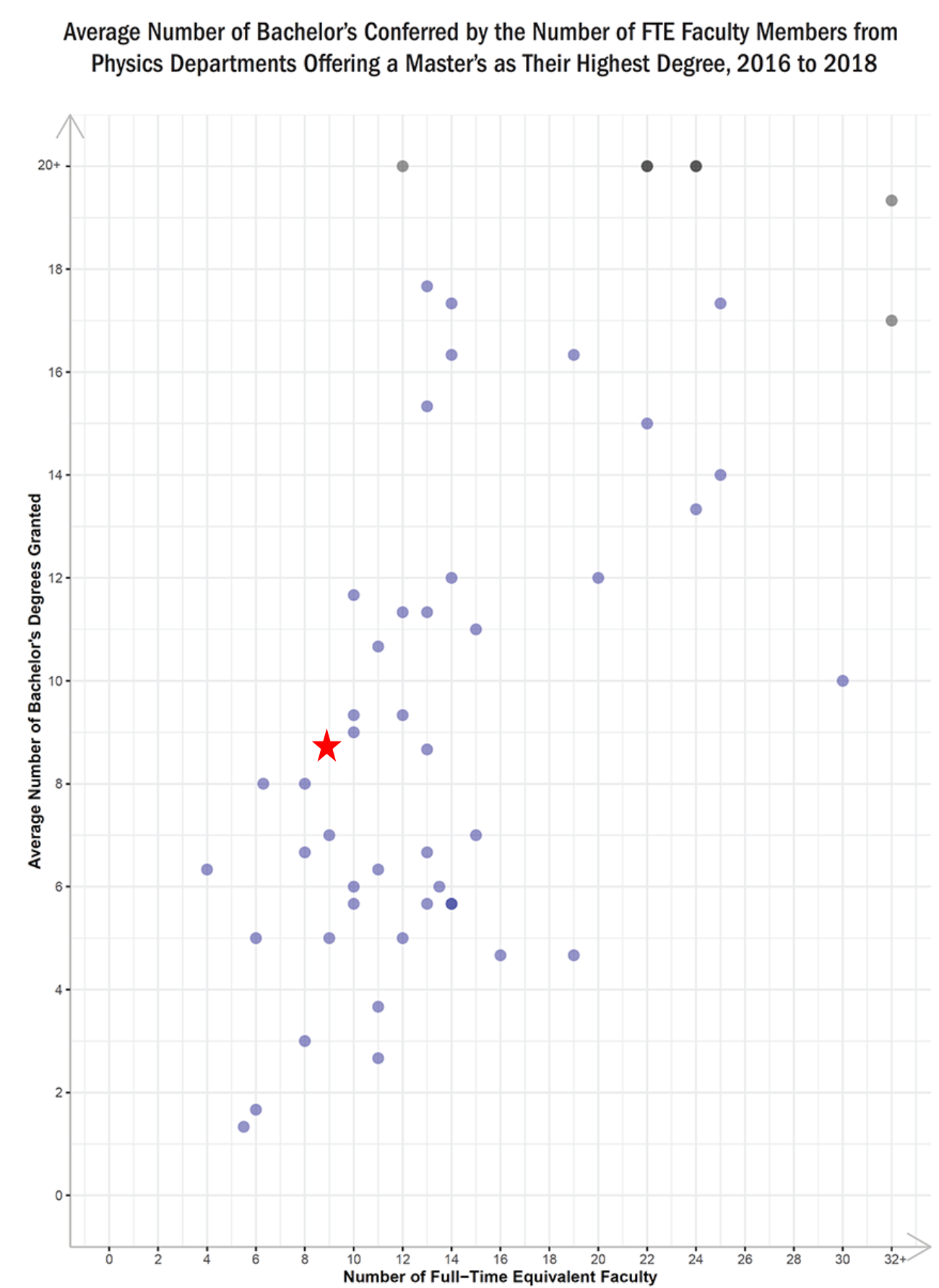


Figure includes 57 departments where the Master's was the highest physics degree offered in 2018. Data were estimated for nonresponding departments.

AIP Statistics aip.org/statistics



Departments that fall beyond the chart range are displayed in gray. Includes only departments where a master's degree is the highest physics degree offered. The average number of bachelor's degrees granted is a three-year average from the classes of 2016, 2017, and 2018. The number of full-time equivalent (FTE) faculty is from the 2017-18 academic year.

AIP Statistics aip.org/statistics

- The physics majors contribute significantly to the University mission through tutoring, helping in the physics labs, and creating an inclusive atmosphere for all our students. **The physics majors contribute 33 % of the total number of hours for teaching assistants (TA) and tutors.**
- The impact of the Physics Department extends beyond its cohort of physics majors, as our courses are the core requirements for many high-enrollment/high-demand programs at CSU, such as Chemical/Electrical/Mechanical/Civil/Computer/Industrial Engineering, Computer Science, Math, Chemistry, Biology, Environmental Sciences, Pharmaceutical Science, Health Sciences, and Integrated Sciences Education.

Society of Physics Students (SPS)

- CSU's chapter of Society of Physics Students (SPS), is at the core of strong student community of physics majors. SPS provides unique leadership, networking, and service opportunities for our undergraduates. Since 2010, the chapter has won a variety of **national awards**: 12 Outstanding SPS Chapter Awards; 2015 Outstanding Chapter Advisor Award, an Undergraduate Research Award, two Chapter Reporter Awards, and 37 + SPS Student Travel Awards that supported student travel to student (PhysCon16&19) and professional (CuWip, APS, AAS) physics conferences.
- In 2011, SPS created a student-led science outreach program "Physics Fridays" that connects CSU undergrads with students at Campus International School, MC2, and BioMed Academy. The program provides exceptional community service by inspiring the next generation of Cleveland's STEM scholars. The outreach has been recognized by the AIP via 11 Marsh W. White, two Blake Lily, and a Future Faces of Physics Awards.



Who do we graduate and do they go to?



The high quality of our approach to education is evidenced by:

- Outstanding employment record of our graduates includes **NASA, CERN, INTEL, GE Aviation, CCF, National Renewable Energy Laboratory, National Census Bureau, and PhD programs at Caltech, John Hopkins, U Chicago, Drexel, Carnegie Mellon, CWRU, U Massachusetts, OSU, U Arizona, Penn State, Michigan State, UCLA, U Tennessee, Kent State**

- Recent graduates have been the recipients of: **3 CSU Valedictorian awards, 4 College Valedictorian awards** (3 COSHP and 1 WCOE); 3 SPS Leadership Awards; **2018 YWCA Dr. Jennie S. Hwang Award**; the 2013 National Student Exchange's **Bette Worley Student Achievement Award**; the **2013 and 2020 NSF's Graduate Research Fellowship**; the **2014 Goldwater Scholarship Honorable Mention**, and the **2016**

Representative physics alumni	CSU Degrees (Physics major)	Current Position	Location
Tyler Rhoades	BA Physics 2020, BS Math Honors 2020, MS Math 2021	Data Analyst, Cleveland Clinic Foundation	Cleveland, OH
Ellen Rea	BA Physics 2020, BE Mechanical Eng 2020	Aerospace Engineer, GE Aviation Edison	Cincinnati, OH
Anthony Dobrila	BS Physics Honors 2018	Software Developer, RoviSys	Aurora, OH
Hona Tsaper	BS Physics 2018, BS Chemistry 2018	Chemist, Cosmax	Solon, OH
Tyler Harris	BS Physics 2017	Test Engineer – Eye and Face, ICS Laboratories, Inc.	Brunswick, OH
Tristan Oryszak-Ley	BA Physics 2015, MS Physics 2017	Fiber Optic Technician, Cosworks: Fiber Optics	Highland Heights, OH
Hannah Shuman-Dee	BS Physics Honors 2014	Senior Toxicologist, Integrity Laboratories	Knoxville, TN
Kaitlin Vandemark	BS Physics Honors 2013, BA Communications 2013	Key Account Manager, ABB Industrial Automation Power Generation	Auburn Hills, MI
Prasenjit Bose	BS Physics Honors 2012, BS Math Honors 2012	Research Staff, INTEL, PhD Physics (July 18), John Hopkins U	Portland, OR
Joseph Glaser	BS Physics Honors 2014, BS Math 2014	Computational physicist, Nano-Grav consortium at West Virginia University, PhD in Astrophysics (Sep 20), Brandeis University	Philadelphia, PA
Achille Nicoletti	BS Physics Honors 2011, BS Electrical Engineering Honors 2011; MS Electrical Engineering 2012	Research fellow, The European Organization for Nuclear Research (CERN), PhD in EE (Dec 17), Swiss Federal Institute of Technology	Zürich, Geneva, Switzerland
Ryan McDonough	BS Physics Honors 2010, BS Chemistry Honors, BA Philosophy 2010	Spectrum Analyst, US Head of International Telecom, Union NASA Glenn Research Center	Cleveland, OH
Vincenzo LaSalvia	BA Physics 2009	Silicon Photonics Engineer II, National Renewable Energy Laboratory (NREL)	Golden, CO
Vincenzo Marinucci	BA Physics-integrated Sci 2020	Science Teacher, Archbishop Hoban High School	Akron, OH
Melissa Jeric	BA Physics 2017	Physics Teacher, Gilmore Academy	Gates Mills, OH
Kristen R. Schuler	BA Physics 2016	Physical Sci. & Physics Teacher, Saint Joseph Academy	Cleveland, OH
Juma Mino	BA Physics 2015, BS Bio, BS Chemistry 2015	Science Teacher, BioMed Science Academy	Rootstown, OH
Zaynab Almusawi	BS Physics 2021	Research Coordinator, Cleveland Clinic	Cleveland, OH
Ryan McDermott	BS Physics 2015, MS Medical Physics 2017	Medical Physics Resident, Baylor Scott and White Hospital	Temple, TX
Loren Marous	BS Physics 2014, MS Medical Physics 2016	Medical Physicist, Upstate Medical Physics, Inc.	Victor, NY
Michael Hardin	BS Physics Honors 2012, BS Math 2012	Medical Physicist, US Oncology Netw., MS Med Physics, U of Cincinnati	Woodlands, TX
Theresa Lincheck	BS Physics 2021, BM Music Performance (Honors) 21	PhD Student at School of Meteorology, University of Oklahoma	Norman, OK
Jacob Adamszyk	BS Physics student, BS Math 2020	PhD Physics student, University of Massachusetts/Boston	Boston, MA
Nikisa Praljak	BS Physics Honors 2020, BS Math Honors 2020	PhD Candidate in Biophysics, University of Chicago	Chicago, IL
Aubrey Lokey	BA Physics 2019, BE Computer Eng 2019	PhD Student in Nuclear Physics, Michigan State University	Ann Arbor, MI
Nicholas Barron	BS Physics Honors 2018	PhD Student in Meteorology, Penn State University	State College, PA
Justin Flaherty	BS Physics Honors 2016, BS Math Honors 2016, MS Physics 2018	PhD Candidate in Physics, Ohio State University	Columbus, OH
Marie Blatnik	BS Physics Honors 2015, BS Electrical Engineering Honors 15	PhD Candidate in Physics, California Institute of Technology (CALTECH)	Pasadena, CA
Phil Dee	BS Physics Honors 2013, BS Civil Engineering 2013	Physics Postdoctoral Fellow, University of Florida, PhD Physics (May 21), University of Tennessee	Gainesville, FL
Krista Freeman	BS Physics Honors 2011	Biophysics Postdoctoral Fellow, University of Pittsburgh, PhD Physics (Aug 17), Carnegie Mellon University	Pittsburgh, PA

CSU Distinguished Alumni Award. Furthermore, our graduates represent CSU on a global stage by acting as leaders of scientific community (e.g. by chairing the American Physical Society's Forum on Graduate Student Affairs, participating in the 65th Lindau Nobel Laureates Meeting).

Into the Future WITH the Physics Major!



- The national statistics shows significant increase in Physics Majors since early 2000s. This is an area of **national growth**.



- Since 2002, the 3-year average of MS physics graduates grew from 2.3 to 7; the 3-year major graduates grew from 5 to 8.7; FT faculty increased from 7 to 9.
- Since a generational shift in FT faculty, program realignment towards student research/professional MS, **CSU became well positioned to participate in the area of national growth in physics degrees.**