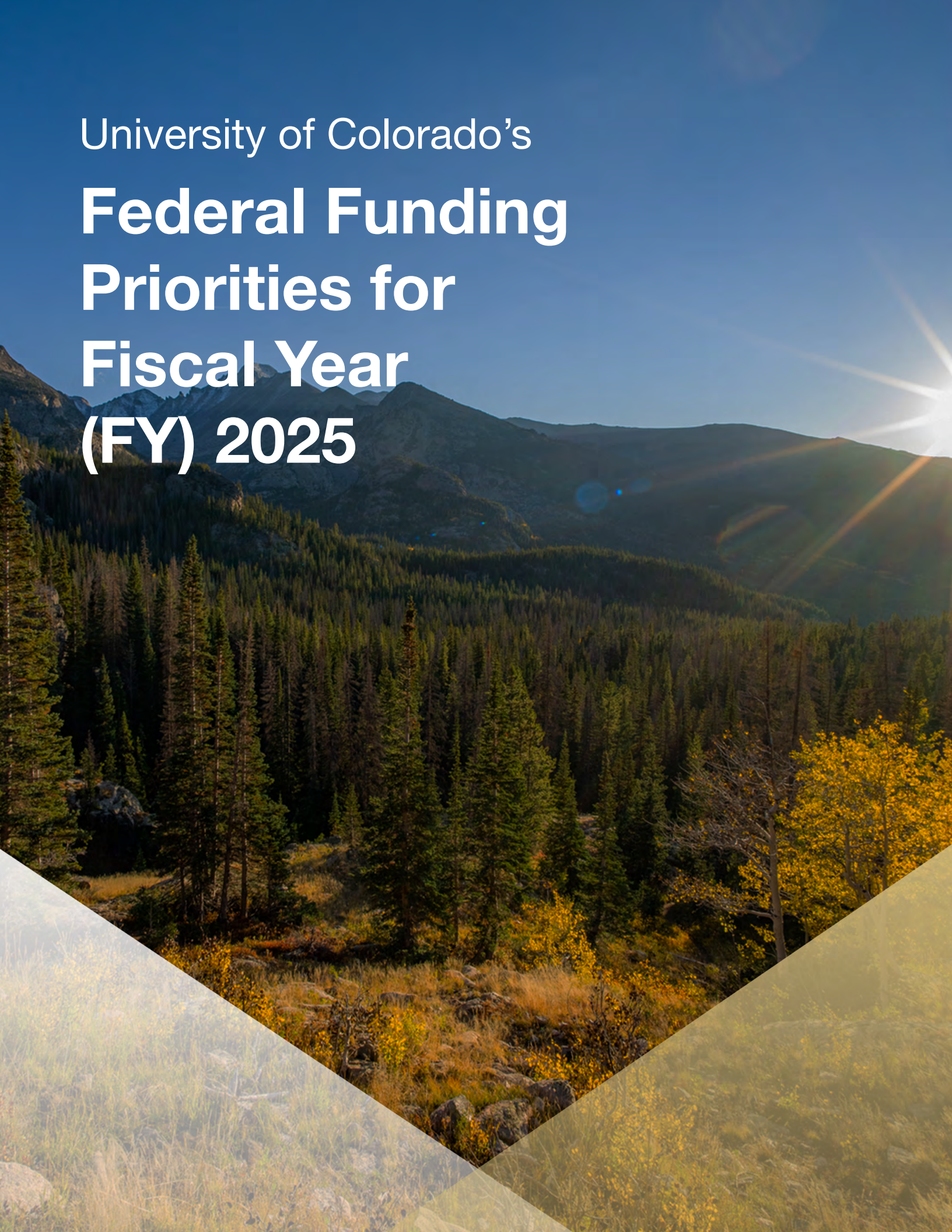


University of Colorado's

Federal Funding Priorities for Fiscal Year (FY) 2025

In this Report

Federal Research Agency Overviews

CU System Programmatic Priorities

($ in millions)

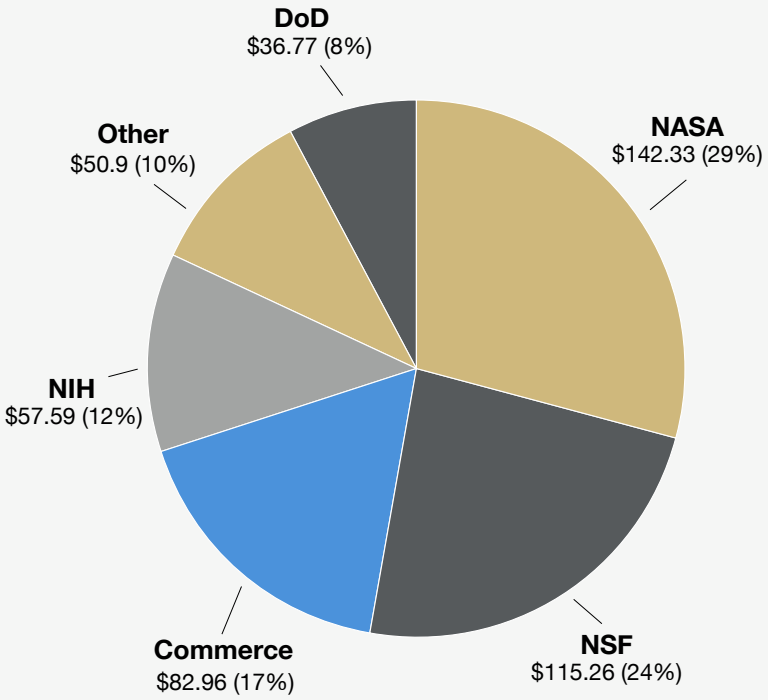
	FY23 Enacted	FY24 Enacted	FY25 Request
Commerce-Justice-Science Bill			
National Aeronautics and Space Administration (NASA)			
Science Mission Directorate	7,800	7,300	9,000
Heliophysics	805	805	900
Earth Science	2,200	2,200	2,400
Aeronautics Research Mission Directorate	935	935	1,000
Space Technology Mission Directorate	1,200	1,100	1,500
Space Grant Program	58	58	65
National Institutes for Standards and Technology (NIST)			
NIST Scientific and Technical Research and Services (STRS)	953	1,080	1,047
NIST Construction of Research Facilities (CRF)	130	88	420
Oceanic and Atmospheric Research (OAR)	661	656	840
Climate Adaptation Partnerships*	16.3	20	20
National Science Foundation (NSF)	9,870	9,060	11,900
Interior-Environment Bill			
National Endowment for the Humanities (NEH)	207	207	225
U.S. Geological Survey (USGS) Climate Adaptation Centers	63	63	65
Joint Fire Science Program**	9	6	20
Labor – Health and Human Services – Education and Related Agencies Bill			
Department of Education			
Pell Grant Maximum award (in thousands)	7,395	7,395	13,000
Supplemental Educational Opportunity Grants (SEOG)	910	910	1,150
Federal Work Study (FWS)	1,230	1,230	1,603
TRIO Programs	1,191	1,191	1,298
International Education Programs (Title VI)	84.7	85.7	91
Institute of Education Sciences (IES)	807.6	793.1	900
Department of Health and Human Services			
National Institutes of Health (NIH) - base	47,500	47,081	51,303
Agency for Healthcare Research & Quality (AHRQ)	373.5	369	500
Health Resources Services Administration (HRSA), Health Professions Workforce Training (Title VII)	579.3	580.3	980
HRSA Nursing Workforce Training (Title VIII)	300	305	530
HRSA Area Health Education Centers (AHEC)	47	47	67
HRSA Children's Graduate Medical Education (GME)	385	390	758
CDC National Institute for Occupational Safety and Health Education and Research Centers	32	32	33
Defense Bill			
Department of Defense (DoD)			
Science and Technology Basic Research (6.1)	2,918	2,628	3,417
Defense Advanced Research Projects Agency (DARPA)	4,060	4,123	4,338
Congressional Directed Medical Research Programs (CDMRPs)	1,530	1,530	
Restoral Core Funding Reduction	311	257	
Veterans Affairs Bill			
VA Medical and Prosthetic Research	916	943	
Energy and Water Bill			
Department of Energy (DOE)			
Office of Science	8,100	8,240	9,500
Energy Efficiency and Renewable Energy (EERE)	3,460	3,460	3,460
Advanced Research Projects Agency for Energy (ARPA-E)	470	460	570

**Previously named Regional Integrated Sciences and Assessments (RISA)*
***JFSP is jointly funded by the Departments of Interior and Agriculture*

FY2023 Federal Agency Awards by Campus

University of Colorado Boulder

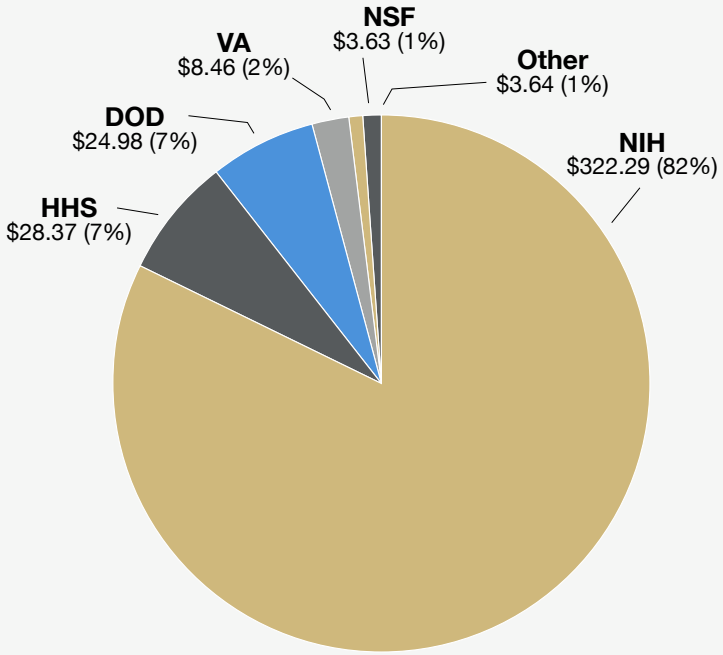
CU Boulder faculty earned more than **$684 million** in sponsored research in FY 2023, including a record **$486 million** from federal agencies.



** Includes DOE National Labs, including NREL*

University of Colorado Anschutz Medical Campus

CU Anschutz Medical Campus faculty earned more than **$867 million** in sponsored research in FY 2023, including more than **$391 million** from federal agencies.



($ in millions)

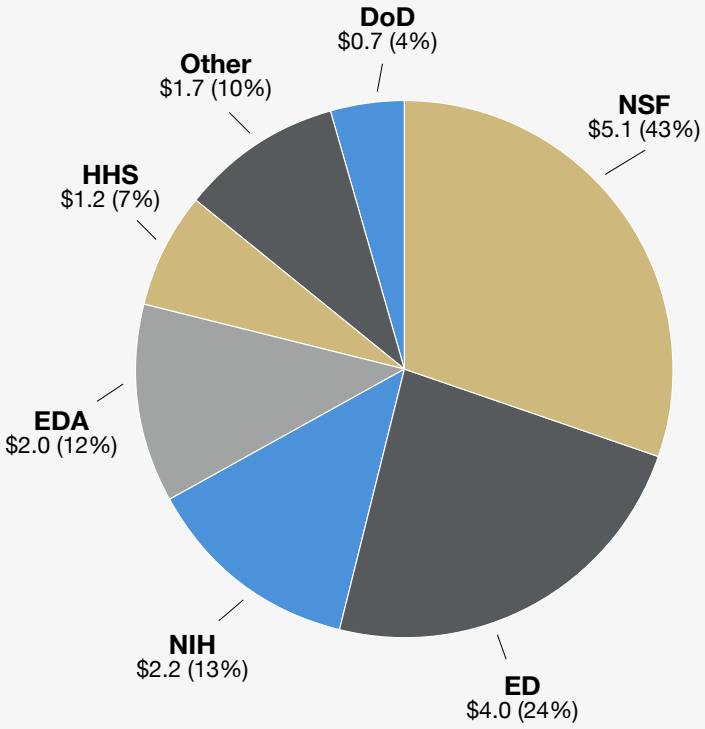
#1
public university recipient of NASA research awards

200
new companies have resulted from CU research

#1
hospital in Colorado

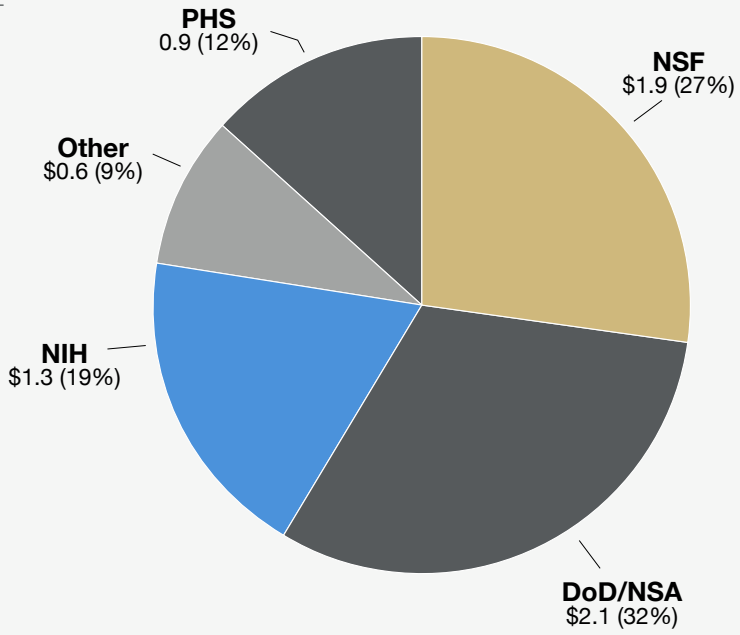
University of Colorado Denver

CU Denver faculty earned **$29 million** in sponsored research and nearly **$17 million** from federal agencies



University of Colorado Colorado Springs

UCCS faculty earned more than **$16 million** in sponsored research with more than **$5 million** directly from federal agencies in FY 2023.



($ in millions)

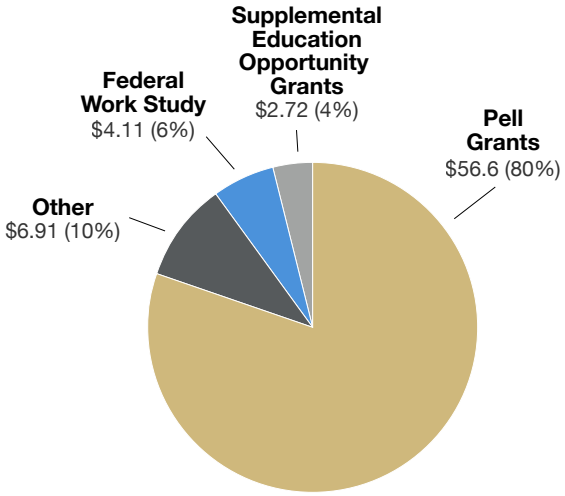
$1.6 billion
in research funding

10
MacArthur Genius Fellows

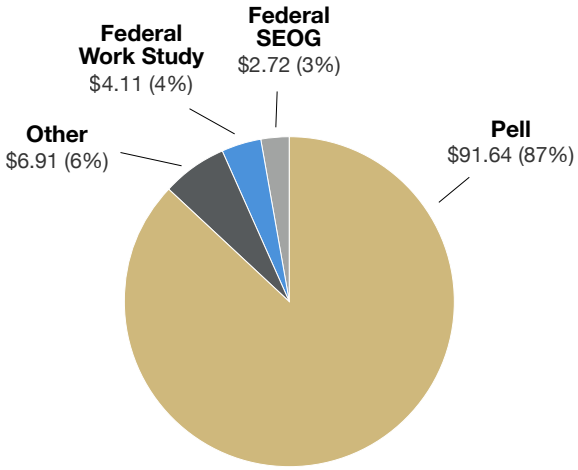
5
Nobel Laureates

FY 2022-23 Federal Financial Aid

FY23 Federal Grant Aid to CU Students



Projected Federal Grant Aid to CU Students, if Pell Maximum Increased to $13,000



($ in millions)

U.S. Department of Education

Federal student aid is critical to ensuring access to higher education for students in Colorado and across the U.S.

The Federal Pell Grant Program provides need-based grants to financially disadvantaged students. Pell Grants are the foundation of low-income students' aid packages, to which other forms of aid are added. The Pell program is the largest federal source of college aid to students and supports students on all CU campuses.

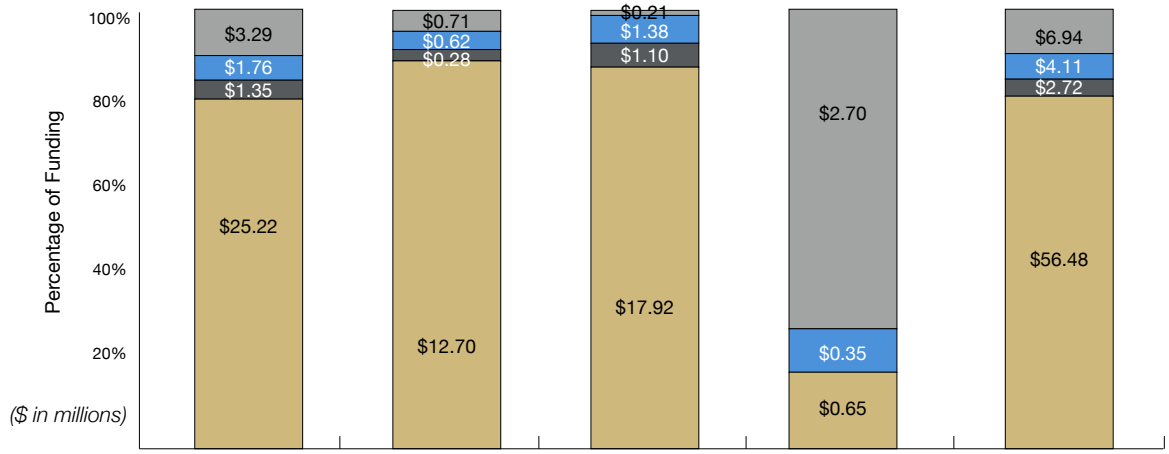
CU supports raising the maximum Pell Grant award from $7,395 to $13,000. Pell Grants used to cover 80 percent of the cost to attend a four-year, public university. Today, however, the maximum grant covers roughly 22 percent of the cost of a CU education. Doubling the maximum Pell Grant award will ease student loan burden, help students meet basic needs, and expand financial aid to more students. Over the past decade, CU internal funding for grants and scholarships has reached $239 million. Greater federal support for Pell Grants will enable the university to stretch this funding to more students and families.

Other important federal student aid programs to CU include Federal Supplemental Educational Opportunity Grants (FSEOG), which provide up to $4,000 in additional grant assistance to Pell recipients with unmet need and require a one-to-three institutional match; Federal Work-Study (FWS); and TRIO Programs (TRIO), which provide outreach and student services for students from disadvantaged backgrounds. CU Denver regularly has waitlists for their successful TRIO programs, and additional resources would enable the university to serve more students.

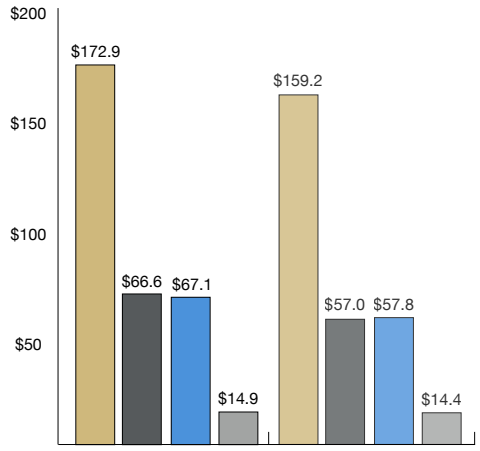
Title VI International Education and Foreign Language Programs support foreign language, area, and international studies infrastructure building programs at U.S. universities. Title VI programs help support our nation's long-term national security, global leadership, and economic competitiveness. **For over 25 years, CU Denver's Institute for International Business has been home to a Title VI sponsored Center for Business Education and Research (CIBER), one of only 16 in the country. CU Boulder is also home to two Title VI-funded centers, the Center for Asian Studies, and the Latin American + Latinx Studies Center.**

FY 2023 Federal Financial Aid — CU System

Financial Aid Type	Students	Amount
Federal Pell Grant	11,892	$56,483,906
Federal Supplemental Education Opportunity Grants (SEOG)	2,793	$2,716,126
Federal Work Study (FWS)	1,276	$4,114,325
Federal Direct (Stafford) Loans – Subsidized	10,881	$43,760,122
Federal Direct (Stafford) Loans – Unsubsidized	18,787	$175,423,674
Federal PLUS Loans	2,767	$71,576,531
Federal Graduate (PLUS) Loans	2,292	$52,686,019



	CU Boulder	UCCS	CU Denver	CU Anschutz	CU Total
Other Federal Grants	$3.29	$0.71	$0.21	$2.70	$6.94
Federal Work Study	$1.76	$0.62	$1.38	$0.35	$4.11
Federal SEOG	$1.34	$0.28	$1.10		$2.72
Pell Grants	$25.22	12.70	$17.92	$0.65	$56.48



Boulder	$172,891,053	$159,168,224
Denver	$68,621,169	$57,000,798
Co Springs	$67,114,969	$57,752,821
Anschutz	$14,876,435	$14,425,507

Impact of Doubling the Pell Grant Maximum Award

Across CU's four campuses, there was more than $310 million in unmet student financial aid impacting more than 20,000 CU students in 2022. Despite significant institutional support through grants and scholarships as well as federal investment in student financial aid, these students face increased burden in attending college. By increasing the Pell Grant maximum award to $13,000 these students' unmet financial need would decrease exponentially, allowing them to obtain a world-class education at CU with greater ease and less debt.

We applaud the actions of the 117th Congress in increasing the Pell Grant maximum award in the Fiscal Year 2023 budget to $7,395 but we also recognize the necessity to further increase this figure. The reality of the Pell Grant is that while it provides a much-needed investment in the education of low-income students and families, it does not provide near the amount necessary to provide these students with an education that does not burden them with student loans for years and decades to come. By significantly increasing the Pell Grant maximum award to $13,000 in FY25, this would provide low-income students with an essential boost in funding, ensuring that they would be able to continue their education without insurmountable financial burdens.

Federal Research Agency Overviews

National Institutes of Health (NIH)

FY2023 NIH support for CU campuses: $421 million

The National Institutes of Health (NIH) funds scientific research that enhances human health, lengthens life, and reduces illness and disability. Biomedical research funded by NIH – and performed by faculty at research universities – produces treatments, cures, and insights about human health that improve the lives of every Coloradan, every American and every person around the world. At no point in history has the importance of NIH been clearer than over the past few years, as it has served as the lynchpin of the world's efforts to fight the spread of COVID-19 and other infectious diseases. The biomedical research community has mobilized in record time to produce the underlying scientific knowledge of the disease that has led to vaccines, tests, new and repurpose treatments, public health guidance, and constantly refined standards of care. In addition to COVID-19, UCHealth University of Colorado Hospital and Children's Hospital Colorado still face ongoing threats of other serious infectious diseases, including RSV and influenza. Clinical researchers at CU continue to work to develop better standards of care for treating patients with such infectious diseases as these.

The National Cancer Institute (NCI) at NIH is the federal government's primary entity for advancing cancer research and training. With the mission of leading, conducting, and supporting cancer research across the nation, the NCI is essential for improving cancer outcomes in the U.S. As part of its mission, the NCI supports 71 NCI-Designated Cancer Centers across the country, including CU's Cancer Center, which was redesignated as an NCI Cancer Center with a strong rating in March 2022. As an NCI-Designated Cancer Center, CU's Cancer Center boasts strengths in basic, translational, clinical, and population science research, supporting the NCI's goals of advancing cancer research and treatments to provide optimal outcomes for all cancer patients.

NIH research means hope for millions of patients and their family members who suffer from debilitating diseases and disorders. One recent study noted that NIH research contributed to all of the 210 FDA-approved new drugs between 2010 and 2016. Nationwide, NIH research projects have decoded the human genome, developed a cure for Hepatitis C, and halted the spread of the HIV/AIDS epidemic. At CU, NIH research support led to the world's first liver transplant, the shingles vaccine and revolutionary scientific advances in treatments for lung cancer, juvenile diabetes and many other conditions. Our faculty continue to make new breakthroughs – seeking cures and treatments in cancer, diabetes, heart disease, Parkinson's disease, Alzheimer's disease and many others. NIH funding allows CU faculty to push the envelope in cutting-edge scientific fields like personalized medicine, immunotherapy and regenerative medicine.

A strong NIH helps ensure U.S. leadership in the life sciences industry. Statewide, $427 million in NIH awards directly supported 7,980 jobs and $1.266 billion in economic activity last year.

CU Anschutz Researchers Serve as a Leader in Translation Health

A new $41 million investment by the National Institutes of Health (NIH) through the National Center for Advancing Translation Sciences (NCATS) will help build research teams of the future, speed up the development of new treatments, and improve human health. Through the Colorado Clinical and Translational Sciences Institute (CCTSI) Anschutz researchers will partner with CU Boulder, CU Denver, and Colorado State University, as well as our clinical hospital partners to conduct leading-edge research that can directly impact health and patient care, reduce health disparities across our state and remain poised to respond to public health emergencies of the future.

Accomplishments from the CCTSI include: Establishing the standard-of-care worldwide for youth with type 2 diabetes through a 15-year, national multicenter study called TODAY 2, discovering the role inflammation plays in lung disease occurring in children with primary ciliary dyskinesia, a rare genetic disease similar to cystic fibrosis; Building bridges for asthma care through a school-centered program that connects schools, families and community health-care providers in underserved Denver neighborhoods; and pioneering innovative solutions to address the lack of participant diversity in clinical trials, including the training of Older Adult Research Specialists to increase the inclusion of older adult peers in clinical trials.

Jen Higgins, Ph.D., a professor in the school of medicine and lead investigator for the CCTSI, said, "Through this grant [people] are going to be getting their care where they live, and we're going to be getting data from the usual provider that they already trust. So that's a really large aspect of this new part of the grant and super exciting."

Ron Sokol, MD, a distinguished professor of pediatrics-gastroenterology in the CU School of Medicine and director of the CCTSI added, "At the CCTSI we are committed to translating discoveries into better, equitable public health and patient care for all."

National Science Foundation (NSF)

FY 2023 NSF support for all CU campuses: $123 million

The National Science Foundation (NSF) is the cornerstone of America's fundamental research enterprise. For more than 70 years, NSF has supported research that advances the health, prosperity and well-being of the nation. NSF is the only federal agency that supports fundamental research in all science and engineering disciplines, from mathematics and the geosciences, to biological, behavioral and computer sciences, to industries of the future such as quantum information science (QIS) and artificial intelligence (AI). **CU Boulder leads numerous NSF-funded national centers and institutes, including in imaging science, quantum sensing, and artificial intelligence**.

NSF advances fundamental, interdisciplinary, and transformative research and education through research and education grants, as well as grants for scientific equipment and infrastructure. The agency supports 25 percent of all federally funded academic fundamental research at U.S. colleges and universities.

NSF also supports our nation's research infrastructure, including through its **National Solar Observatory (NSO),** headquartered in Boulder, Colorado, which operates telescopes to advance our understanding of the Sun. Boulder is also home to the NSF-sponsored **National Center for Atmospheric Research (NCAR),** which helps advance understanding of the sun-atmosphere system.

In addition, since 1976 CU Boulder's **Institute of Behavioral Science** has been home to the **Natural Hazards Center**, an NSF-designated information clearinghouse for the societal dimensions of hazards and disasters. Today, they're rapidly bringing together social scientists, engineers and environmental scientists to collect, share, and understand data on the December 2021 Marshall Fire, the most destructive wildfire in Colorado history.

NSF programs also support science, technology, engineering and mathematics (STEM) learning and education, and are essential to CU's national leadership in this area. NSF's investments in STEM training are essential to preparing the next generation STEM workforce, as are its contributions to graduate education through training grants and its flagship Graduate Research Fellowship Program (GRFP). 13,000 students compete annually for 2,000 of these prestigious awards. CU Boulder graduate students have a high success rate, and the university is in the top 15 nationwide for fellowships awarded . CU supports significantly increasing the number of fellowships and size of stipends available through this program.

CU Boulder is the top NSF-funded academic institution in Colorado. Last year, more than $346 million in NSF awards statewide supported fundamental science, advanced technical education, entrepreneurial training, STEM teacher training, small business development, major research instrumentation, and more.

Colorado Wins NSF Regional Innovation Engine

In January , the National Science Foundation announced Colorado's selection as one of 10 first-ever NSF Engines. The designation brings $15 million to the state and our regional partners over the next two years and up to $160 million over 10 years.

CU Boulder and CU Denver researchers are key partners in the project dubbed the Colorado-Wyoming Climate Resilience Engine (CO-WY Engine) . The campuses are part of a coalition, led by Innosphere Ventures, that includes research universities, community colleges, government agencies, workforce centers, and industry and corporate partners.

The CO-WY Engine aims to develop and commercialize climate-resilient technologies in areas such as wildfire mitigation, water resource management, and sustainable agriculture with the goal of helping communities mitigate the environmental and economic threats of a changing climate. The Engine is expected to generate $1.5 billion in regional GDP impact and create more than 22,000 new climate technology-related jobs.

CU Boulder Chancellor Phil DeStefano said, "The selection of the CO-WY Engine underscores our commitment to developing meaningful solutions to climate change by fostering cutting-edge research and technology."

Phillip De Leon, PhD, Chief Research Officer for CU Denver, added, "The collaboration also promises to give our students a wonderful opportunity to be on the frontlines of developing these innovations and then ready to use them once they graduate to help our communities build climate resiliency here and nationwide."

National Aeronautics and Space Administration (NASA)

FY 2023 NASA support for CU Boulder: $142 million

NASA-funded research has revolutionized our understanding of earth and space sciences, the life sciences, and aeronautics as well as led to innovative technologies, and contributed significantly to Colorado, which boasts the largest aerospace economy per capita in the nation.

NASA's Science Mission Directorate, which includes the Earth Science, Planetary Science, Astrophysics, and Heliophysics divisions, is essential to understanding global changes to the Earth and answering fundamental questions about the universe through space exploration. The engineering development and scientific research enabling these missions are both groundbreaking and inspirational.

Heliophysics seeks to understand the Sun and its interactions with Earth and the solar system, including space weather, which impacts the performance and security of power grids and communications networks that are part of our daily lives. CU Boulder is home to the **Space Weather Technology, Research and Education Center**, which serves as a catalyst for space weather research and technology development across the Front Range. CU Boulder's new **Space Weather Center for Excellence**, supported by a $10 million NASA award, will research space weather between the Earth and moon to find ways to make the region safer for satellites. Within Heliophysics, CU supports increased funding for Explorer Class Missions, principal investigator-led missions that maximize return on investment by accomplishing important scientific goals at relatively low cost.

Earth Science has pioneered long-term global monitoring of a wide range of environmental phenomena. Scientists use data collected by NASA instruments to study and address wildfires, landfill methane, airborne dust, ocean productivity, and more. CU Boulder's **Laboratory for Atmospheric and Space Physics (LASP)** is a leader in this area. LASP leads several climate monitoring missions, including: the **Total Spectral and Solar Irradiance Sensor (TSIS-1),** a mission measuring the Sun's energy input to Earth, **TSIS-2**, which will launch in spring 2025, and **CLARREO Pathfinder**, a mission to measure sunlight reflected by the Earth and Moon as a means of detecting Earth's subtle climate change trends decades sooner than otherwise possible.

NASA's Space Technology Mission Directorate (STMD) produces the new technologies required for future NASA missions and commercial space activities. STMD also plays a key role in developing our nation's aerospace workforce through the NASA Space Technology Graduate Researchers program. CU supports maintaining robust support for STMD and its missions and graduate research activities.

CU also supports NASA's Space Grant Program, a national network of state-based consortia of academia, industry, and education organizations. **CU Boulder hosts a robust Space Grant program that involves 19 Colorado higher education institutions and the Space Foundation and serves nearly 600 college and university students across Colorado each year**. The program cultivates the next generation of Colorado STEM leaders through space-based hands-on projects.

CU Scientists and Engineers to Help Collect Stardust as Part of NASA Mission

Scientists and engineers at CU Boulder will take part in an effort to collect stardust as part of NASA's Interstellar Mapping and Acceleration Probe (IMAP) mission.

Since 2018, a team from the Laboratory for Atmospheric and Space Physics (LASP) at CU Boulder had led development on an instrument known as the Interstellar Dust Experiment (IDEX). This instrument was completed in mid-January 2024 and was transported to the Johns Hopkins University Applied Physics Laboratory in Maryland to be installed onto the IMAP spacecraft. IMAP plans to launch in spring 2025.

IDEX will detect and analyze the composition of hundreds of interstellar dust particles. Dan Baker, director of LASP, said, "For some two decades the LASP team has refined and advanced the detection techniques to allow truly amazing measurements that revolutionize our understanding of the origin and evolution of our solar system and the vast cosmos beyond."

Department of Defense (DoD)

FY 2023 DoD support for CU: $62 million

Department of Defense (DoD) basic and applied research programs give rise to many of the military technologies deployed on the battlefield today. Addressing complex military challenges requires new technologies rooted in fundamental research conducted at U.S. colleges and universities, which produce breakthroughs and discoveries as well as educate students that go on to work in the national security enterprise. Many graduate students funded by DOD basic research are inspired from their experience to pursue work in the defense industry, national research labs, and academia, representing the foundation for the future of DOD science and technology (S&T).

CU contributes significantly to the national security arena, including in strategic priorities such as hypersonics; cybersecurity, space situational awareness; positioning, navigation, and timing; autonomous systems; remote sensing data analytics; SmallSats; quantum sensing; as well as human performance and wellness. **CU Boulder is home to the Center for National Security Initiatives (NSI), which provides high-impact national security research and workforce development. Through student participation in national security research, NSI addresses the ever-increasing demand for qualified and experienced aerospace and defense professionals in Colorado and across the nation**.

CU supports DoD basic research (6.1) programs such as the University Research Initiatives (URIs) program elements, which fund the Army, Navy and Air Force's Multidisciplinary University Research Initiative (MURI) programs and Defense University Research Instrumentation Programs (DURIP). The MURI program regularly sponsors university basic research that produces revolutionary new military technologies. Nanotechnology, drones, biological detection capabilities and stealth detection sensors all stem from MURI-sponsored scientific research. The DURIP program helps ensure universities have state-of-the-art equipment needed to conduct cutting edge defense research that will help the warfighter succeed on the battlefield. In addition, CU supports social science research in areas of strategic importance to U.S. national security policy funded by the Minerva Research Initiative. For our early career faculty, programs such as the Service Young Investigator Programs, Summer Faculty Fellows, and ARL Open campus are critical to connecting faculty to the DOD research enterprise.

CU also supports DoD's applied research (6.2) and advanced technology development (6.3) S&T and other key technology readiness levels. These programs are critical to moving basic research into technology enabled capabilities that provide military readiness and technological superiority, especially within the space domain. **CU continues to support university-led initiatives at DoD, such as Space Force's University Consortium for Space Technology, which leverages academia's technical expertise and workforce development in support of our national security space enterprise. Last year, CU Boulder won the first-ever Space Strategic Technology Institute awarded under the Consortium to study space domain awareness. The university plans to compete for additional institutes on topics of interest this year**.

CU Anschutz Center for COMBAT Research, which receives support from the DoD and the Defense Health Agency (DHA), aims to facilitate the execution of combat and deployment-related research by navigating successful relationships with military scientists, clinical investigators, combat leaders, and field operators to produce successful innovations, material solutions, and knowledge products of high impact to the warfighter. DoD support for the COMBAT center puts CU in the forefront of combat casualty care.

CU Boulder Wins First-Ever Space Strategic Technology Institute to Track Objects Orbiting the Moon

Last summer, the Air Force Research Laboratory awarded a multi-university team led by CU Boulder a $5 million Space Strategic Technology Institute to track objects orbiting near the moon.

The goal of the project is to improve space domain awareness in high Earth orbits and in the vicinity of the moon. Research joining telescopes, sensor technology, and artificial intelligence will be used to improve existing tracking systems, which have been unable to adapt to growth in commercial and government projects in high orbit.

Marcus Holzinger, associate professor in the Ann and H.J. Smead Department of Aerospace Engineering Sciences and principal investigator, explained that "we want to advance civil space traffic management and planetary defense for asteroids, and assist the U.S. Space Force with space tracking," improving the timeliness and quality of decision-making in space.

CU Boulder's Center for National Security Initiatives will also play an important role in the institute. The institute is the first-ever awarded by Space Force's University Consortium for Space Technology.

National Institute of Standards and Technology (NIST)

FY 2023 NIST support for CU Boulder: $18 million

The National Institute of Standards and Technology (NIST) promotes U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life. NIST conducts world-class research, in collaboration with academia and industry, to advance the nation's technology infrastructure and to help U.S. companies improve products and services.

CU Boulder is home to NIST's first joint university research institute – JILA – and collaborates closely with NIST's Boulder lab. **JILA is one of the nation's leading research institutes in the physical sciences, including in the fields of quantum information science & technology; atomic & molecular physics; laser physics; biophysics; chemical physics; nanoscience; and precision measurement**. JILA fellows include two Nobel laureates, Eric Cornell and John Hall, for quantum-related insights. In addition to research breakthroughs, JILA advances science by training future generations of researchers and innovators. 50 years of JILA is the foundation of Colorado's burgeoning quantum ecosystem. The institute has generated both the science and the talent that has propelled the field forward and attracted quantum companies to the Centennial State.

NIST Scientific and Technical Research and Services (STRS) funds NIST's laboratory programs, which work at the cutting edge of science to ensure U.S. science and engineering communities have the measurements, data, and technologies necessary to further innovation and competitiveness. NIST's core measurement science programs provide calibrations and standards for industry broadly – from oil and gas to aerospace and medicine. NIST also plays an essential role in emerging industries such as quantum and artificial intelligence. NIST is one of three key agencies tasked with ensuring U.S. leadership in quantum as part of the National Quantum Initiative Act, and leads the Quantum Economic Development Consortium, a government and private sector collaboration designed to tackle some of the most pressing challenges of moving quantum from lab to market.

NIST Construction of Research Facilities (CRF) funds construction activities, including the maintenance, repair, improvements, and major renovation of facilities occupied or used by NIST in Gaithersburg, Maryland; Boulder and Fort Collins, Colorado; and Kauai, Hawaii, to meet current and future measurement and research needs for the nation. With many NIST facilities dating from the 1950s and 1960s, basic environmental controls and infrastructure are failing at an increasing rate, undermining NIST's ability to deliver the precision measurement science necessary to drive U.S. innovation and industrial competitiveness.

Scientists from CU Boulder, NIST Develop Laser-Based Breathalyzer Able to Detect COVID-19 in Real-Time

Last April, scientists from CU Boulder and NIST unveiled a new laser-based breathalyzer powered by quantum technology and artificial intelligence that can detect COVID-19 with excellent accuracy. The technology shows the potential of breath analysis as a non-invasive means of testing and diagnosing diverse conditions and diseases, including COVID-19.

Jun Ye, senior author and JILA Fellow, used a technique called frequency comb spectroscopy born of Nobel Prize-winning technology to identify biomarkers of disease in human breath. Testing between May 2021 and January 2022 demonstrated excellent accuracy in diagnosing COVID-19, with the process taking less than one hour from collection to result.

"This was a wonderful collaboration to bring some of the technologies that they had developed as physicists into the medical setting," said molecular biologist Leslie Leinwand, chief scientific officer for CU Boulder's BioFrontiers Institute and a co-author on the study.

Future research aims to miniaturize the current breathalyzer system, expand its diagnostic capabilities, and use the technology to identify factors contributing to illness. The university also recently paired up with seasoned entrepreneur Eva Yao of FLARI through CU Boulder's new Embark Deep Tech Startup Creator program to speed moving this groundbreaking breathalyzer technology from lab to market.

The Air Force Office of Scientific Research, NSF, and NIH also supported this research.

National Oceanic and Atmospheric Administration (NOAA)

FY 2023 NOAA support for CU Boulder: $64 million

The National Oceanic and Atmospheric Administration (NOAA) provides weather, water, and climate forecasts and warnings for the nation. Underpinning these activities is NOAA intramural and external research, supported through the Office of Oceanic and Atmospheric Research (OAR). Research at NOAA laboratories, and through partnerships with universities and science institutions, provides foundational and applied science and policy-relevant findings for use by forecasters, policymakers, resource managers, and the private sector.

NOAA's science mission ensures that complex policy decisions are informed by the best available science. As a result, atmospheric and oceanic data generation and analysis are the core functions of the agency. Robustly funding NOAA OAR will ensure that data production and scientific analysis produce research findings that policymakers can use to maximize the nation's economic well-being.

NOAA OAR programs of particular interest to CU Boulder include Climate Research, which houses funding for two Cooperative Institutes based in Colorado, including the CU Boulder-based **Cooperative Institute for Research in the Environmental Sciences (CIRES)** – the oldest and largest of NOAA's national network of Cooperative Institutes (CIs) – and the Cooperative Institute for Research in the Atmosphere (CIRA) in Fort Collins at Colorado State University. Colorado is the only state in the U.S. to boast two NOAA CIs. **CIRES connects CU Boulder's academic innovations, including world-renowned research and teaching, with NOAA, the nation's premier earth science research agency. CIRES's more than 900 scientists work on any and every environmental issue in deep and meaningful ways.** Other laboratories include the NOAA Earth Systems Research Lab, which is also located in Boulder. Also under OAR, Regional Climate Data and Information supports the **Climate Adaptation Partnerships (CAP) (formerly RISA)** program which funds CU Boulder's **Western Water Assessment (WWA),** an applied research program that addresses societal vulnerabilities related to climate, particularly in water resources, across the Intermountain West – which includes Colorado, Utah, Wyoming – and beyond.

Instruments Monitoring Sun and Space Weather Deployed by CIRES and NOAA Scientists at Full Operational Maturity in Record Time

Instruments that will monitor the Sun and space weather on the GOES-18 satellite are at full operational maturity after final validations were completed in December 2023 by researchers from CIRES and NOAA.

GOES-18, the third satellite in the GOES-R series of NOAA weather satellites, monitors solar activity and forecasts potentially disruptive geomagnetic storms. These forecasts can provide early warning of possible impacts to Earth's space environment and potentially disruptive events on the ground, such as disruptions to power utilities and communication and navigation systems.

Validation tests instruments and data to ensure their readiness for use in forecasting. The two previous iterations of the GOES-R satellites, GOES-16 and GOES-17, took 59 and 46 months respectively to validate. The 21 months for validation on GOES-18 was "an unprecedented timeline," according to Alessandra Abe Pacini, a heliophysics data steward with NOAA's National Centers for Environmental Information.

The partnership between CIRES and NOAA will continue with the launch of GOES-U at the end of April 2024. GOES-U will have a coronagraph that allows for better observation of the sun's corona.

Department of Energy (DOE)

FY 2023 DOE support for CU Boulder: $38 million

The Department of Energy's (DOE) Office of Science (SC) supports long-term scientific research, often in areas where U.S. industry will not invest, including the physical and biological sciences, computing, and energy. DOE SC is the primary supporter of basic physical sciences research, providing approximately 39 percent of total federal funding for this research. SC supports competitive research at DOE state-of-the-art user facilities and more than 300 universities, including CU. SC is the steward of 10 of DOE's 17 national laboratories, which offer researchers capabilities that are unmatched anywhere in the world. SC also supports the pipeline of exceptional young scientists through its Graduate Fellowship and Early Career research programs.

CU Boulder is the top DOE Office of Science-funded academic institution in Colorado. In FY 2022, over $27 million in SC awards statewide supported researchers probing the frontiers of physics, chemistry, materials science, systems biology, and more.

Within the DOE Office of Energy Efficiency and Renewable Energy (EERE), is the National Renewable Energy Laboratory (NREL), which supports the research, development, demonstration, and deployment of energy efficient, renewable, and related technologies. NREL is located in Golden, Colorado and closely collaborates with CU Boulder, most visibly through the joint CU Boulder/ NREL **Renewable and Sustainable Energy Institute (RASEI). RASEI's mission is to expedite solutions that transform energy by advancing renewable energy science, engineering and analysis through research, education, and industry partnerships.**

The Advanced Research Projects Agency-Energy (ARPA-E) invests in high-risk, high-reward energy research that is unlikely to be funded by industry or other parts of DOE. ARPA-E leverages federal funds to spur private investment in promising technologies. Since 2009, when ARPA-E was established, the agency has invested $3.76 billion in R&D funding for more than 1,560 potentially transformational energy technology projects nationwide., This includes more than $41 million invested in energy research projects at CU Boulder. Colorado is #4 in ARPA-E funding to states and CU Boulder ranks #3 in ARPA-E funding to universities.

UCCS Bozhko Awarded Reputable DOE Research Grant to Forward Work in Quantum Physics

In September 2023, Dmytro Bozhko, Assistant Professor in the Department of Physics and Energy Science at UCCS, was awarded a DOE research grant through the Funding for Accelerated, Inclusive Research (FAIR) initiative. This initiative, which distributes $37 million amongst 44 institutions, is meant to increase research capacity at historically underrepresented institutions.

The grant is for Bozhko's work in antiferromagnets and Bose-Einstein condensates (BECs). "When people hear about quantum effects, they generally think of effects manifesting themselves on an atomic scale," explained Bozhko. "A Bose-Einstein condensate (BEC) is a specific state of matter where an ensemble of particles with integer spin starts to behave like one big macroscopic particle. For that reason, a BEC is often called a macroscopic quantum state. Since its experimental discovery in 1995, BEC has become a hot topic in physics and had its first applications for quantum computing noise reduction (…) Recently, antiferromagnetic materials have attracted remarkable interest from the scientific community due to their unique properties – high operating frequencies up to terahertz (a thousand times higher than Wi-Fi frequency) combined with significantly suppressed stray fields, which could allow for miniaturization of electronic high-frequency components. One of our main goals is to study the properties of antiferromagnets and achieve BEC up to ambient temperature in these materials."

Bozhko also explained his hope that the award will expand quantum physics research at UCCS and increase collaborative work between internal experimental physics groups and external collaborations with Argonne National Laboratory.

This research continues a legacy of research of the BEC at the University of Colorado. In 2001, the Nobel Prize in Physics was awarded to Eric Cornell, JILA and NIST, and Carl Wieman, JILA and University of Colorado, Boulder, for their work in early research achieving BEC. Wolfgang Ketterle of the Massachusetts Institute of Technology was also awarded the prize for his contributions.

National Endowment for the Humanities (NEH)

FY 2023 NEH support to CU: TBD

NEH is one of the largest funders of humanities program in the U.S., providing vital funding to universities, cultural institutions, and individual scholars alike to strengthen teaching and learning in colleges, facilitate research and original scholarship, and preserve and provide access to cultural and educational resources.

CU is dedicated to preserving and uplifting humanities research, which enhances our worldview, offers critical insights into our past and present, and shows us how we grow as a civilization. CU is a leader in humanities education and research in the Rocky Mountain region, from CU Boulder's Center for Humanities and the Arts to the UCCS's Heller Center for Arts and Humanities and Center for Research Frontiers in the Digital Humanities in Colorado Springs, CU campuses provide creative pathways for Colorado communities to engage in the arts and humanitiesthroughout the West. CU researchers also directly benefit from NEH grant funding, which has supported research on the impact of war on Colorado communities, revitalizing the Arapaho language, and more.

NEH Grant Awarded to CU Denver Professors to Examine History of Auraria Neighborhood

In May 2023, CU Denver History Professors Rachel Gross and Cameron Blevins won a grant through the NEH's Humanities Initiatives at Colleges and Universities. The $149,000 grant will lead to the creation of a digital tour and curricular materials examining the university's development and impact on the Auraria neighborhood of Denver. CLAS English professor Michelle Comstock will also serve as a PI.

The project, "Recovering Auraria's Past: Building a Digital Tour of a Displaced Neighborhood and Reckoning with Campus History," will explore and preserve history relating to the Chicano neighborhood that lived in Auraria prior to displacement due to construction of the Auraria Higher Education Center. Three interrelated activities, including a curriculum project, reading group and speaker series, and digital walking tour, will mark the 50th anniversary of the campus.

The project will distribute existing work and further explore histories of the campus for researchers, students, and community members associated with the Auraria neighborhood.