Public Witness Testimony for the Record
on Fiscal Year 2023
to the
House Appropriations Commerce, Justice, and Science Subcommittee

Submitted by:
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We request $9 billion for the NASA Science Mission Directorate, $11 billion for the National Science Foundation, and $8.8 billion for the Department of Energy Office of Science. These increases enable work on the new decadal priorities for the astronomical sciences to begin.

On behalf of the over 8,000 members of the American Astronomical Society (AAS), thank you for the opportunity to submit public witness testimony for the record regarding our FY2023 funding priorities for NASA, the National Science Foundation (NSF), and the Department of Energy.

I would like to thank the Subcommittee for your steady support of the astronomical sciences in the past. NASA, the NSF, and DOE provide the vital programs and cutting-edge research facilities that our community of students, scientists, engineers, and educators depends on. Your investment in these agencies supports the fields of astronomy, planetary science, and heliophysics.

This year's FY2023 testimony is unique. Once per decade, each field of the astronomical sciences organizes a decadal survey led by the National Academies. These surveys gather input from thousands of astronomers and transform it into a set of community-consensus scientific priorities. In November 2021 the Astronomy and Astrophysics decadal survey was released, followed by the Planetary Science survey in April 2022. **With two new decadal surveys in-hand, our FY2023 request is especially vital. It will lay the groundwork for the next decade of mission development, scientific research, and ultimately, the next breakthrough discoveries.**

The decadal surveys deal in fundamental questions about the nature of the universe, the origins of life, and most tantalizingly, whether we are alone. These big questions demand big efforts—effort in better supporting our researchers, effort in building bigger and more complex facilities, and effort in developing the next generation of scientists. **To fuel this effort we require strong, sustained growth in funding for the NASA Science Mission Directorate, NSF, and DOE Office of Science.**

The FY2023 President's Budget Request (PBR), formulated too early to account for the decadal surveys, does not establish a strong foundation upon which to build our next generation of astronomical facilities. Despite awe-inspiring successes launching and deploying the James

Webb Space Telescope, flying the robotic Ingenuity helicopter on Mars, and soon releasing the next Event Horizon Telescope direct image of a black hole, the PBR has failed to recognize these outstanding accomplishments with further opportunities. We must remedy this situation, because exceptional science requires exceptional growth.

Exceptional science will be enabled with facilities and missions that are more interwoven than ever before. To understand the universe and our origins demands that we open more windows of observation on the ground and in space, operating simultaneously for maximum scientific return. The astronomy decadal survey lays out the necessary synergies, suggesting two public-private Extremely Large Telescopes (ELTs) on the ground and ultimately a suite of new space telescopes and probes operating across x-ray, ultraviolet, visible, and infrared wavelengths.

These space telescopes—meant to replace the aging Hubble and eventually JWST and Roman telescopes—will be developed through a NASA mission and technology maturation program capitalizing on the risk retirement lessons learned through previous flagship missions. Beginning with the requested growth in FY2023, funding towards development must begin as soon as possible to accommodate the decades-long buildout process. Otherwise, we risk a period with no space telescopes at all. American-led large space telescopes have positioned us as global leaders in astronomy, and we risk ceding that leadership should we not begin planning for our next most ambitious missions. **For NASA SMD's Astrophysics division we therefore request $1.9 billion.**

In the planetary sciences, a suite of new missions proposes to continue exploring the solar system and challenging our engineering best and brightest. The highest priorities of the planetary science decadal will take us out to the critically underexplored outer gas giants with a Uranus probe and continue work on the Mars Sample Return mission to reveal the prebiotic chemistry of our celestial neighbor. Alongside a set of smaller probes, we will learn more about the origins of our solar system and the inner workings of its members. **For NASA SMD's Planetary Science division we therefore request $3.6 billion.**

Closest to home, **our NASA Heliophysics division request of $935 million** continues the mission of understanding our sun, funding a range of novel missions such as the recently selected Multi-slit Solar Explorer (MUSE) MIDEX mission, increasing research and analysis funding availability, and supporting human space exploration efforts through improved characterization of the radiation environment around Earth, the Moon, and Mars. Growth in heliophysics funding is especially vital to maintain the health of the field, which has suffered from flat budget lines for the last several years.

Growth at NASA must be complimented by growth at the National Science Foundation, for which we request $11 billion. The priorities laid out in the decadal surveys demand more from NSF than ever before. The surveys ask NSF to forge forward in the new fields of time domain and multi-messenger astrophysics, capitalizing on synergies between the Vera C. Rubin Observatory, IceCube neutrino observatory, and LIGO gravitational wave observatory. At the same time, new facilities are needed. The ELTs, CMB-S4*, and ngVLA are vital threads in a

tapestry of ground and space observatories that must all work in concert to discover habitable worlds, understand the nature of dark matter and dark energy, and protect our planet from near earth objects.

The National Science Foundation is the backbone for much of astronomy, funding research across most of the US states and territories. However, the strain of supporting current facilities and building new ones with only anemic growth of the Astronomy Division budget has had the disastrous side-effect of undermining support for the scientists who use the facilities. As funding opportunities for researchers and students have declined, we find ourselves with fewer hands to handle the work of research and analysis. Our brightest scientists spend ever more time on grant-writing than on researching, and the opportunities for student involvement dwindle. **Funding for research grants must increase, or we will never unlock the discoveries waiting in the deluge of data flowing out of our great observatories.**

By increasing funding across the agencies involved in astronomical sciences, the House CJS Subcommittee is investing in more than pure scientific discovery. Beyond the possible technological spin-offs from developing cutting-edge facilities, astronomy as a field is an incubator for STEM talent that flows out into the wider workforce. Students in astronomy, planetary science, and heliophysics learn nationally prioritized skills in data science, machine learning, artificial intelligence, and supercomputing. The astronomical sciences have also been at the vanguard of broadening STEM participation, a theme re-emphasized in the decadal surveys. An investment in astronomy is an investment in a more vibrant workforce spanning every geography and identity group. It is an investment in American leadership.

Thank you again for your support, and for your time and consideration of these priorities.

Summary Table

($ million)	FY22 Enacted	AAS Ask	Ask – FY22 ($)	Ask – FY22 (%)
NASA	24,000	27,800	+$3,800	+16%
SMD	7,600	9,000	+$1,400	+18%
PSD	3,100	3,600	+$500	+16%
Helio	780	935	+$155	+20%
Astro	1,600	1,900	+$300	+19%
NSF	8,800	11,000	+$2,200	+25%
DOE-OSC	7,500	8,800	+$1,300	+17%

* The CMB-S4 project is funded jointly by NSF and DOE Office of Science High Energy Physics