AMERICAN ASTRONOMICAL SOCIETY

# Decadal Surveys for Astronomical Sciences

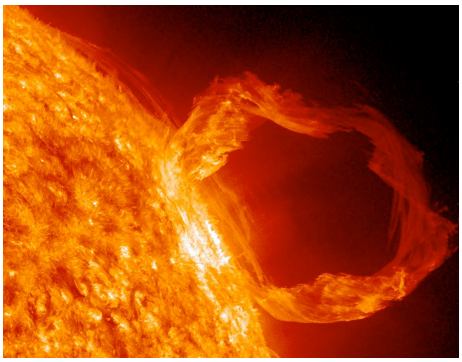

**The New Worlds, New Horizons in Astronomy & Astrophysics and Vision and Voyages in Planetary Sciences decadal surveys have been released by the National Research Council.** The heliophysics community will release their decadal survey in the spring of 2012. The decadal surveys represent the consensus of the scientific communities' review of the current state of understanding of the science and have a prioritized list of projects, programs and missions important in the next decade. Agencies and policy makers look to these reports for guidance on scientific priorities.

# Astronomy Is Important to the Nation

**Federal support has made the United States a world leader in astronomy and astrophysics.** The Nobel Prize in Physics was awarded in October 2011 to Saul Perlmutter, Brian P. Schmidt, and Adam G. Riess for the discovery of the accelerating expansion of the Universe through observations of distant supernovae they found that roughly 96 percent of the matter and energy content of the universe is completely unknown to us.

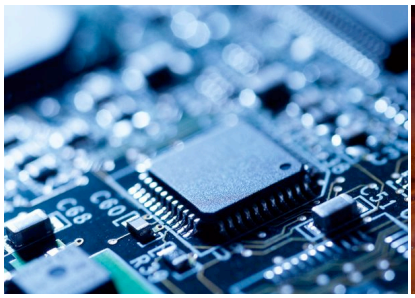
Since the inception of the Nobel Prize, 14 of the 18 astronomy-related Nobel Prize Laureates have been from the United States. Their research was conducted with federal support from NASA, NSF, and the Department of Energy (DOE) High Energy Physics program.

**The broad public appeal of Astronomy makes it one of the best-known and accessible gateway sciences, attracting students to STEM education and jobs.** The astronomical sciences have close connections with other scientific fields such as physics, biology, chemistry, engineering, and computation. Undergraduate astronomy courses in colleges and universities serve 250,000 students annually, representing about 10 percent of all undergraduates nationwide. Among them are about 15 percent of future K-12 teachers, for whom introductory astronomy is often their only science course.



**The volatile atmosphere of the Sun is responsible for space weather** -- a part of the field of scientific research called heliophysics, which focuses on the causes and consequences of the Sun's dynamic processes. The sun is waking up from a minimum of activity in the solar cycle. The study of space weather has practical applications as high energy particles and magnetized gas clouds from the Sun can affect space systems, ground systems, and humans in space, such as satellites, GPS, power grids, and long distance radio communications.

2000 Florida Ave, NW, Suite 400 * Washington, DC 20009-1231 * tel 202-328-2010 * fax 202-234-2560 * www.aas.org




From left to right: X-ray, ultraviolet, and infrared detectors developed by astronomers make microchips more reliable and cheaper, Charge coupled devices (CCDs) designed for the Hubble Space Telescope are used in digital mammography eliminating surgical biopsy, Airport luggage scanners use detectors developed for X-ray astronomy, Software proved effective and reliable for rover and rocket technology is used for secure online shopping and banking. www.sti.nasa.gov/tto/

# Future of Science & Astronomy in the US

It is time for America to tackle the largest drivers of our debt and deficit, rather than shortchange our future by cutting funding on our most talented students, essential research, and entrepreneurial potential. Reduced funding to research and facilities would have a severe impact on cutting-edge research that is critical to our future. Cuts to government-sponsored scientific research and critical research facilities are counterproductive at a time when we are seeking to facilitate and spark economic growth. Spending cuts need to be smart and strategic.

The Congress instead should look to the bipartisan Senate process that is considering the recommendations of the fiscal responsibility commission. **Only reforms of this magnitude can reverse our budget outlook and enable smarter, more strategic decisions about the non-defense discretionary portion of the budget.** We know all of our elected representatives seek the long-term success of our nation and the maintenance of leadership in science and technology. The quality of life our children and grandchildren will inherit depends upon the choices Congress makes.

**Table 1**. Astronomy in the Federal R&D Budget FY2013

(budget authority in millions of dollars)

| | FY 2011 | FY 2012 | **FY 2013** | Change FY 12-13 | |
|---|---|---|---|---|---|
| | Actual | Estimate | **Budget** | Amount | Percent |
| Natl Aero and Space Admin | 18,448 | 17,771 | **17,711** | -60 | -0.3% |
| *Science* | *4,920* | *5,073* | ***4,911*** | -162 | -3.2% |
| *Heliophysics* | *639* | *621* | ***648*** | 27 | 4.4% |
| *Planetary Science* | *1,451* | *1,501* | ***1,192*** | -309 | -20.6% |
| *Astrophysics* | *631* | *673* | ***659*** | -13 | -2.0% |
| *James Webb ST* | *477* | *519* | ***628*** | 109 | 21.0% |
| National Science Foundation | 6,860 | 7,033 | **7,373** | 340 | 4.8% |
| *Astronomical Sciences* | *237* | *235* | ***245*** | 10 | 4.3% |
| *Research* | *66* | *73* | ***84*** | 11 | 14.5% |
| *Education* | *6* | *7* | ***6*** | -1 | -12.8% |
| *Infrastructure* | *165* | *155* | ***155*** | 0 | 0.1% |
| *Major Res. Equip & Facils* | *125* | *197* | ***196*** | -1 | -0.5% |
| Department of Energy | | | | | |
| *Office of Science* | *4,897* | *4,874* | ***4,992*** | 119 | 2.4% |
| *High Energy Physics* | *776* | *791* | ***777*** | -14 | -1.8% |
| *Cosmic Frontiers* | *75* | *68* | ***79*** | 11 | 15.9% |

# Funding Astronomy and Astrophysics

Congressional support for the James Webb Space Telescope (JWST) is a testament to the foresight and understanding of the United States being a leader in advanced scientific research. JWST has made great progress and continues to do so, meeting milestones within cost and schedule of the new baseline. JWST will revolutionize our understanding of the Universe.

The AAS is deeply concerned about the cuts to NASA's Planetary Science Division and insufficient funds for the priorities of the 2010 astronomy and astrophysics decadal survey. A cross-cutting concern is the inadequate funding for the medium and small-scale missions in the Astrophysics Explorer Program, the Heliophysics Explorer Program and the equivalent explorer programs in Planetary Science called New Frontiers and Discovery.

The AAS continues to support restarting domestic production of Plutonium-238. Pu-238 is of critical importance to the development of planetary science missions. There is no viable alternative to power deep space missions, as solar panels cannot produce enough electricity far from the Sun. Spacecraft equipped with Pu-238, from left to right: New Frontier Mission to Pluto launched in 2006; Cassini Mission to Saturn launched in 1997; Mars Science Laboratory to be launched in fall 2011, using up the dwindling supply of Pu-238; and the Jupiter Europa Orbiter, a flagship mission in the planetary decadal survey, in jeopardy without restart production of Pu-238.