

## Basic Energy Sciences

### **The Program**

Basic Energy Sciences (BES) supports fundamental research to understand, predict, and ultimately control matter and energy at the electronic, atomic and molecular levels in order to provide the foundations for new energy technologies and to support DOE missions in energy, environment, and national security. The BES program also plans, constructs and operates major scientific user facilities to serve researchers from universities, national laboratories and private institutions.

### **The Request**

The President requests \$1,849,300,000 for Basic Energy Sciences, an increase of 6.7% from last year's appropriation.

### **The Reason**

Requested funds are intended for efforts such as:

- Increased funding for the Energy Frontier Research Centers <http://science.energy.gov/bes/efrc/> and continued support for Energy Innovation Hubs <http://energy.gov/science-innovation/innovation/hubs>
- Increased research in the computational materials sciences
- Mid-scale instrumentation for ultrafast electron scattering
- The operations of BES facilities, which include five x-ray light sources, two neutron sources, and five Nanoscale Science Research Centers, are at near optimal level (~99%): <http://science.energy.gov/user-facilities/basic-energy-sciences/>; the National Synchrotron Light Source-II (NSLS-II) at Brookhaven Lab, which is one of the five x-ray light sources, will begin its first full year of operations <http://www.bnl.gov/ps/nsls2/beamlines/>
- The Linac Coherent Light Source-II at SLAC, on which construction continues, and
- Two major items of equipment:
  - The NSLS-II Experimental Tools at Brookhaven Lab <http://www.bnl.gov/nsls2/project/next/> and
  - The Advanced Photon Source Upgrade at Argonne Lab [http://www.anl.gov/sites/anl.gov/files/APS\\_Upgrade%204pg\\_0313.pdf](http://www.anl.gov/sites/anl.gov/files/APS_Upgrade%204pg_0313.pdf)

### **The Research (and Developments)**

- Self-Assembled Nanotextures Create Antireflective Surface on Silicon Solar Cells: <http://www.bnl.gov/newsroom/news.php?a=11685>
- From the Lab to your Digital Device, Quantum Dots Make Quantum Leaps: <http://newscenter.lbl.gov/2015/01/08/lab-digital-device-quantum-dots-made-quantum-leaps/>

- Crown Ethers Flatten in Graphene For Strong, Specific Binding:  
<http://www.ornl.gov/ornl/news/features/2014/crown-ethers-flatten-in-graphene-for-strong-specific-binding>
- Researchers Pump Up Oil Accumulation in Plant Leaves:  
<http://www.bnl.gov/newsroom/news.php?a=11668> and
- Researchers Fight Friction and Wear with One-Atom-Thick Graphene:  
<http://www.anl.gov/articles/researchers-fight-friction-and-wear-one-atom-thick-graphene>
- Ultrafast Imaging of Complex Systems in 3-D at Near Atomic Resolution Becoming Increasingly Possible:
- <http://www.anl.gov/articles/ultrafast-imaging-complex-systems-3-d-near-atomic-resolution-becoming-increasingly-possible>
- National Synchrotron Light Source II Achieves ‘First Light’:  
<http://www.bnl.gov/newsroom/news.php?a=11677>
- More Research Highlights:  
<http://science.energy.gov/discovery-and-innovation/highlights/?category=&prog=BES&perf=&addl=&page=>