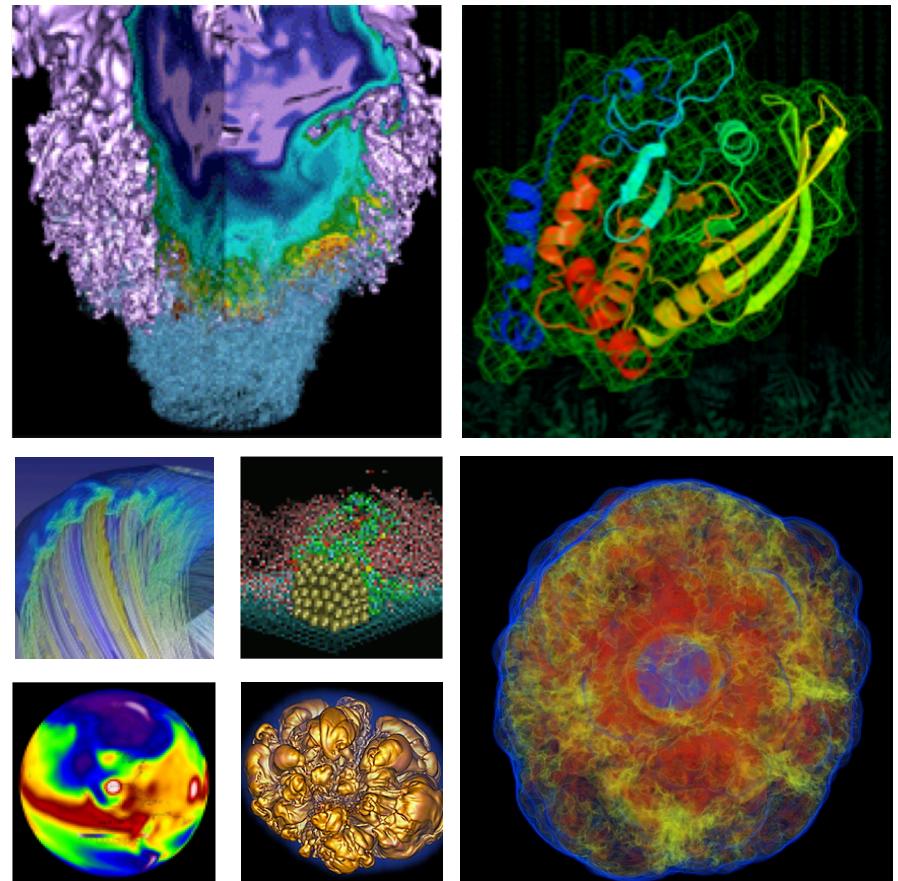


# NERSC Resources

Petascale Computing Institute 2019



**Woo-Sun Yang**  
**NERSC User Engagement Group**

August 21, 2019

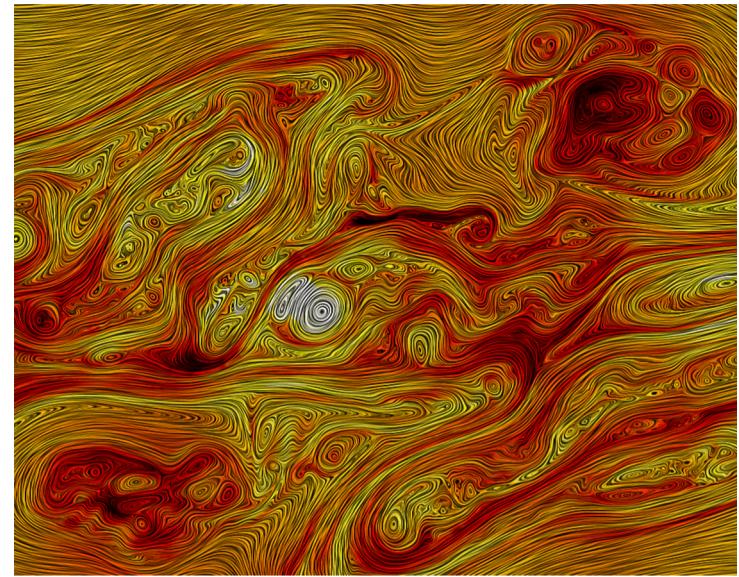


- **National Energy Research Scientific Computing Center**
  - Established 1974, first unclassified supercomputer center
  - Original mission: to enable computational science as complement to magnetically controlled plasma experiment
- **Today's mission: *Accelerate scientific discovery at the DOE Office of Science through High-Performance Computing and Extreme Data Analysis***
- **NERSC is a national user facility**

# About NERSC

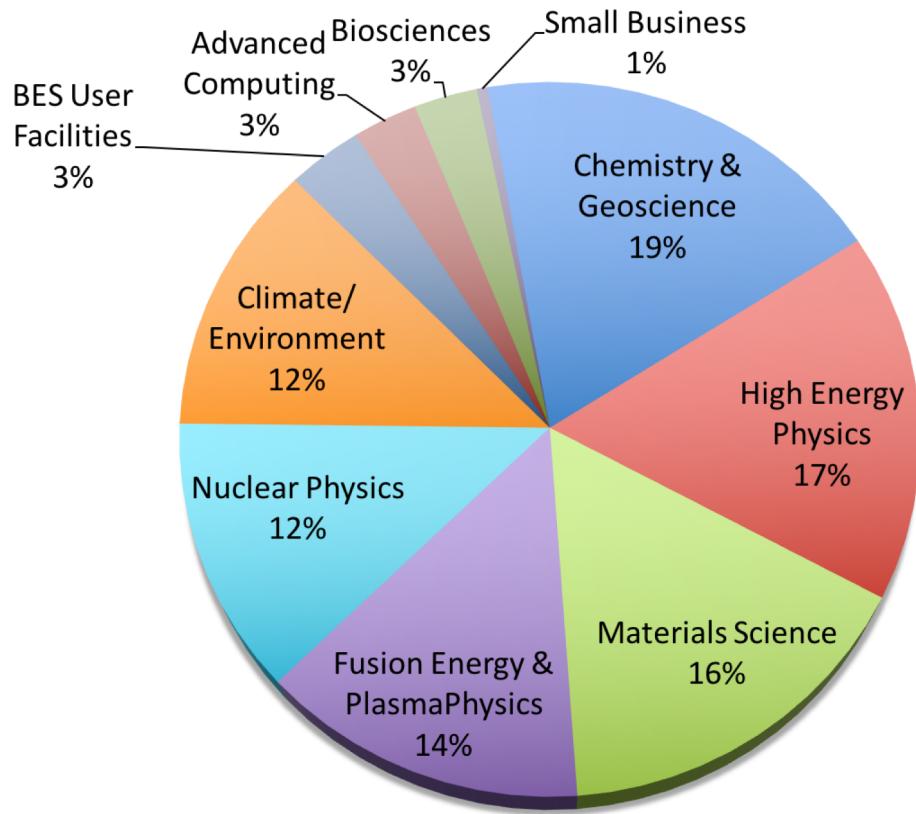


- **Diverse workload:**
  - 7000 users, 800 projects
  - 600 codes, 100s of users daily
- **Allocations primarily controlled by DOE**
  - 80% DOE Annual production awards (ERCAP)
    - O(10K)-O(10M) hour awards
    - Proposal-based, chosen by DOE program managers
  - 10% DOE ASCR Leadership Computing Challenge
  - 10% NERSC reserve



*Turbulence in Solar Wind*

# DOE View of NERSC Workload



ASCR	Advanced Scientific Computing Research
BER	Biological & Environmental Research
BES	Basic Energy Sciences
FES	Fusion Energy Sciences
HEP	High Energy Physics
NP	Nuclear Physics
SBIR	Small Business Innovation Research

# Focus on Science



NERSC users produce publish more than any other center in the world\*; ~2,500 / year

2018



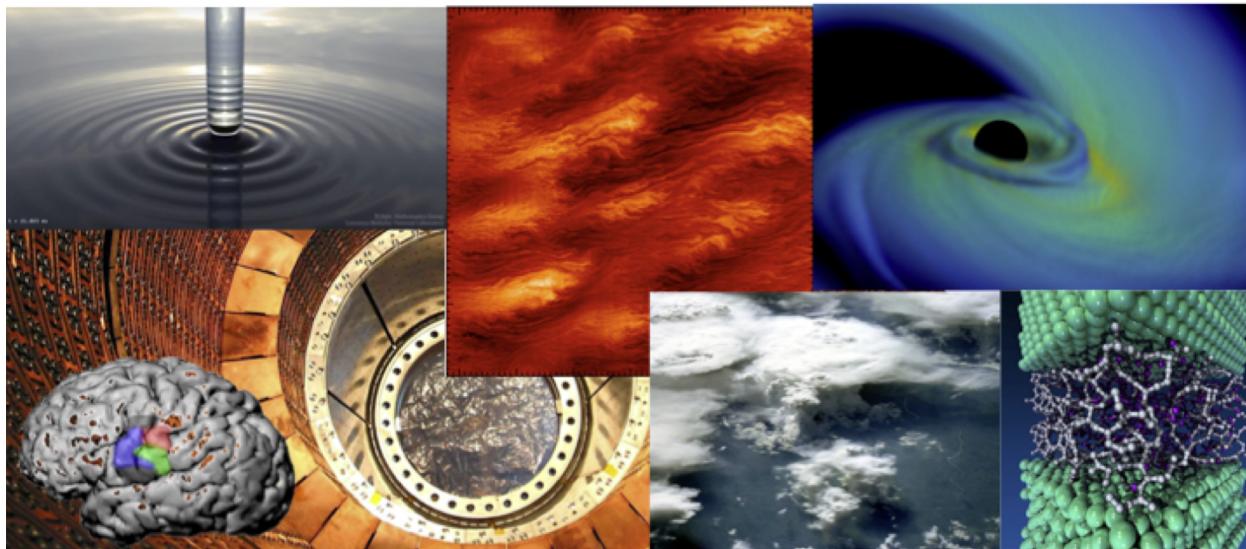
14 in Nature  
31 in Nature Comm.  
82 in other journals



11 in  
Science

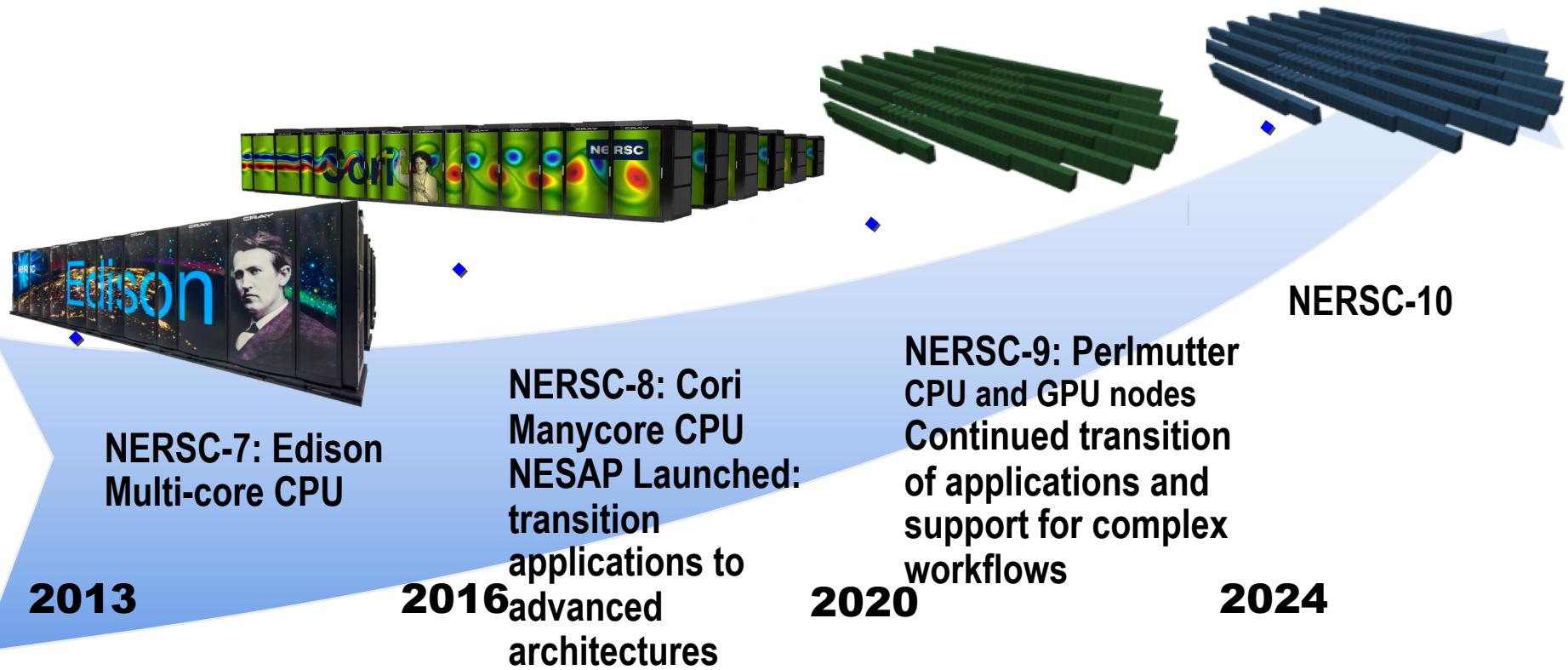


6 Nobel-prize  
winning users



\* as far as we can tell

# NERSC Systems Roadmap



2013

NERSC-7: Edison  
Multi-core CPU

2016  
NERSC-8: Cori  
Manycore CPU  
NESAP Launched:  
transition  
applications to  
advanced  
architectures

2020

NERSC-9: Perlmutter  
CPU and GPU nodes  
Continued transition  
of applications and  
support for complex  
workflows

2024



U.S. DEPARTMENT OF  
**ENERGY** | Office of  
Science

# NERSC-9: A System Optimized for Science



- Named after Saul Perlmutter, winner of 2011 Nobel Prize for discovery of the accelerating expansion of the universe
- Cray Shasta System providing 3-4x capability of Cori system
- First NERSC system designed to meet needs of both large scale simulation and data analysis from experimental facilities
  - Includes both NVIDIA GPU-accelerated and AMD CPU-only nodes
  - Cray Slingshot high-performance network will support Terabit rate connections to system
  - Optimized data software stack enabling analytics and ML at scale
  - All-Flash filesystem for I/O acceleration
- Robust readiness program for simulation, data and learning applications and complex workflows
- Delivery in late 2020





# National Energy Research Scientific Computing Center