HEP-ASCR SciDAC -3

SciDAC PI Meeting 2012

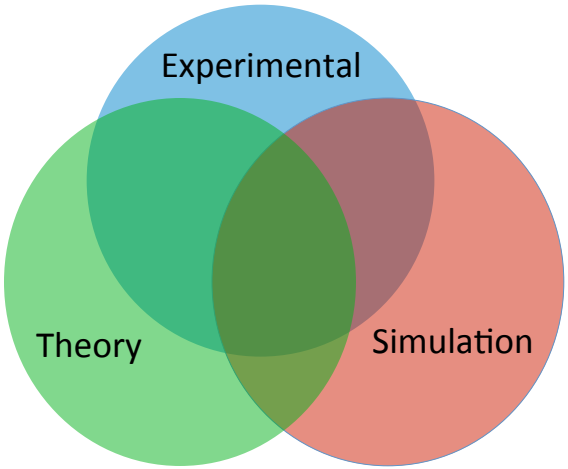
Lali Chatterjee
Program Manager
High Energy Physics (HEP)

HEP Mission

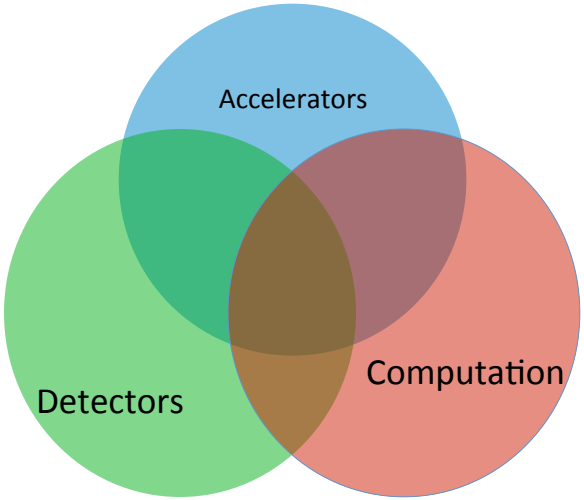
- to understand how our universe works at its most fundamental level…..
- by discovering the most elementary constituents of matter and energy,
- exploring the basic nature of space & time,
- and probing the interactions between them.

Takes us from micro scales deep inside hadrons,
to cosmic scales of millions of light years…
We rely heavily on Computing and Technology….

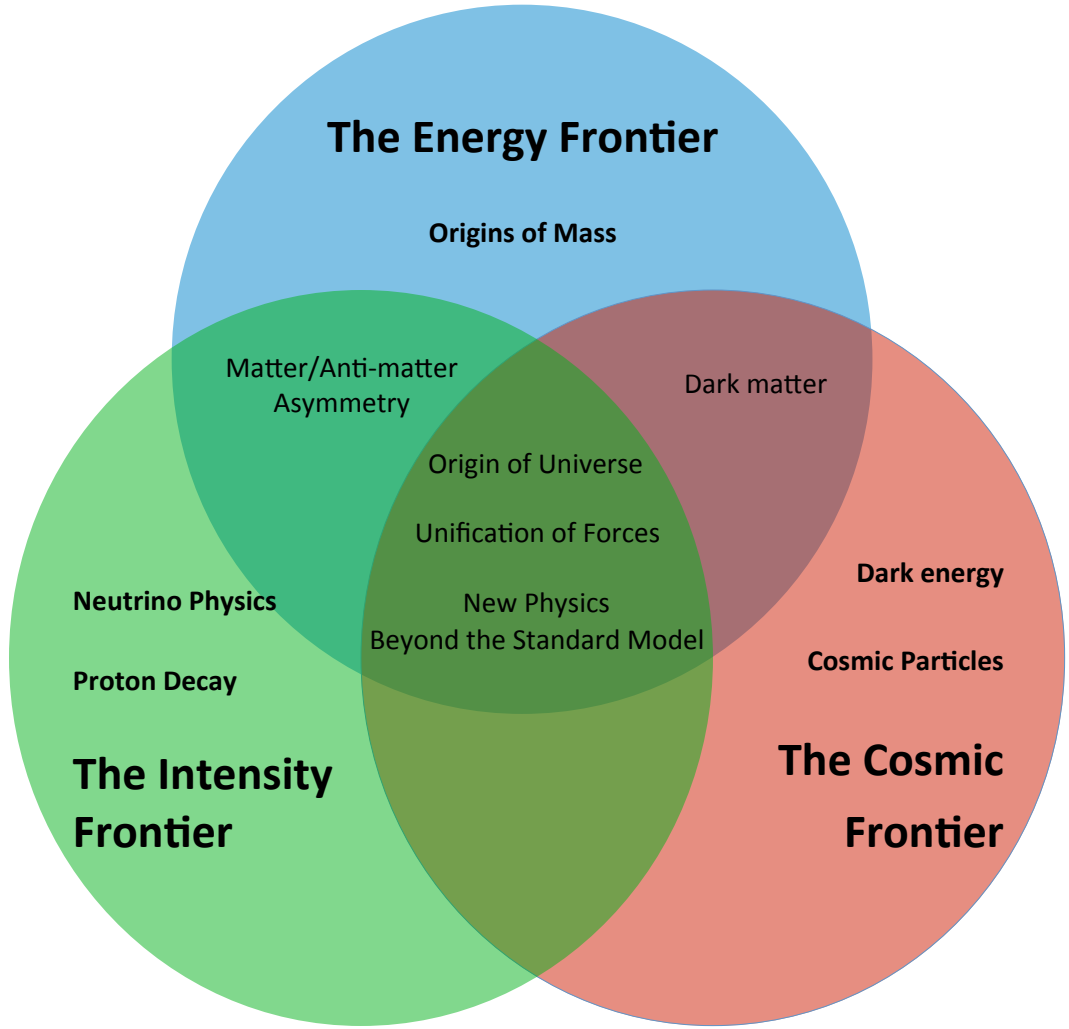
Physics and Technology



Along Three Paths



Enabled by Advanced Technologies in:



Physics Frontiers

HEP-ASCR SciDAC-3 Portfolio

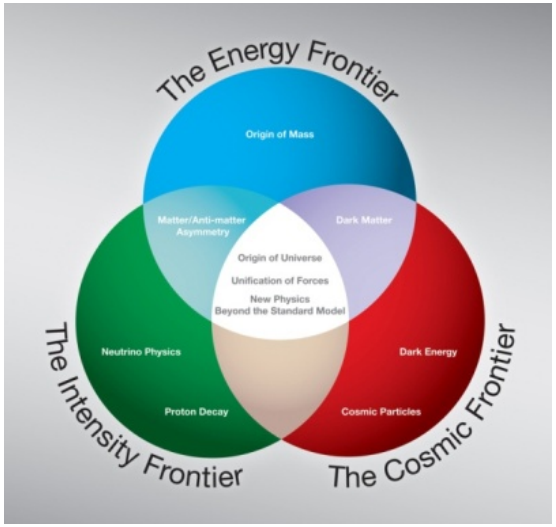
ASCR Program Manager: Dr. Randall Laviolette

Lattice Gauge Theory Research:

Searching for Physics Beyond the Standard Model: Strongly Coupled Field Theories at The Intensity and Energy Frontiers

Cosmic Frontier Scientific Simulations:

Computation-Driven Discovery for the Dark Universe



Accelerator Science Modeling & Simulation :

Community Project for Accelerator Science and Simulation (ComPASS-2)

Portfolio multi Institutional and includes **ALL SciDAC Institutes** - SciDAC model HEP-ASCR partnerships and overlaps extend beyond SciDAC -3….

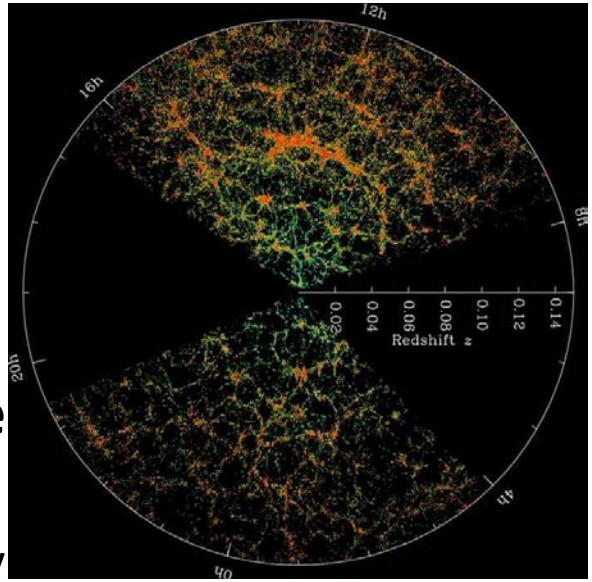
Computational HEP

HEP research is 'compute intensive' on all the three frontiers

The 2011 Nobel Prize in Physics to

Saul Perlmutter, Adam Riess, Brian Schmidt,

"for the discovery of the accelerating expansion of the Universe through observations of distant supernovae" **used a robotic telescope equipped with a CCD detector instead of traditional camera and Relied heavily on computing**

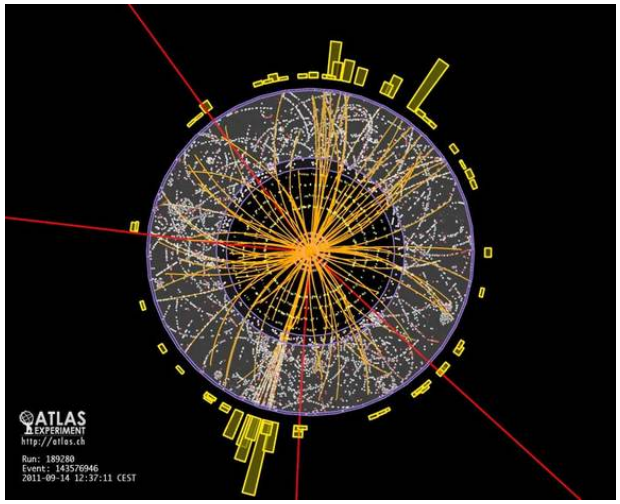


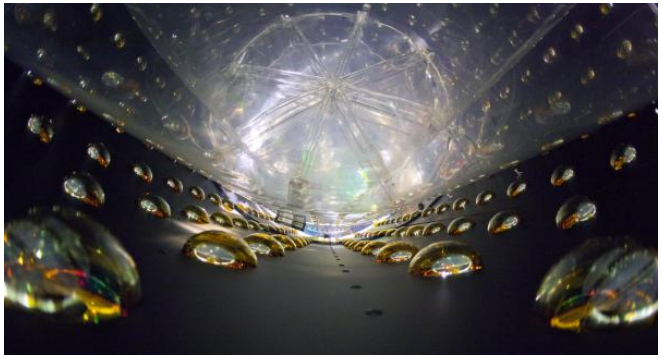
As we move forward along the Cosmic Frontier, we face massive computing and data challenges – both from simulations and from experiments – and likewise for the Energy Frontier after LHC upgrades…..

Photo: from Sloan Sky Survey

These are Exciting Times

After decades of
'We have to find the Higgs Boson'
We have now found 'A Higgs Like Boson'……
(photo: ATLAS event)





We have also found a long sought neutrino mixing angle -

As new discoveries open new thresholds of knowledge, we have to understand the physics at deeper levels….. hence the importance of our SciDAC-3 projects

So why ARE these Projects Important?

Lattice Gauge Theories sharpen our understanding of the universe through precision tests of the standard model and probes of new physics Beyond the Standard Model

Cosmic Frontier HPC Simulations are critical to understand and interpret the data from our multi-pronged experimental program that seek answers from the study of the Cosmos

Accelerator Simulations will help us strengthen our accelerator design and technology for more powerful ways to explore the Energy and Intensity frontiers

Thank- You and over to our project Pis….