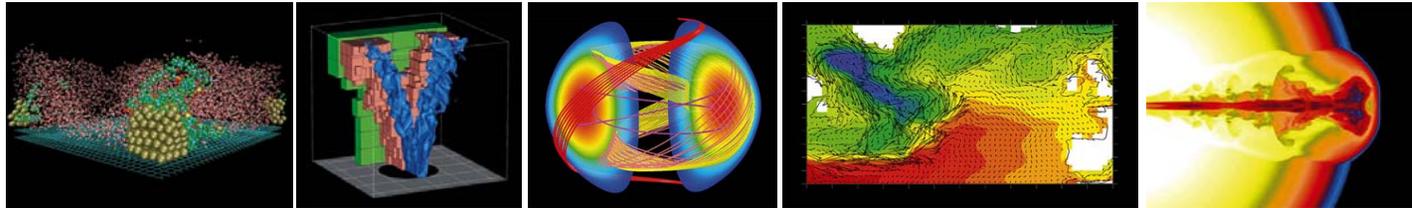




Computational Research & Theory Facility

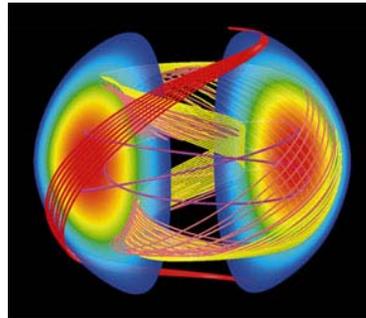


Science Driven Computing



CRT Programs

National Energy Research
Scientific Computing Center
(NERSC) www.nersc.gov



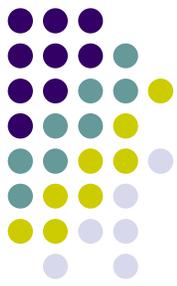
Computational Research
Division (CRD)
crd.lbl.gov

Computational Science &
Engineering (CSE)



&

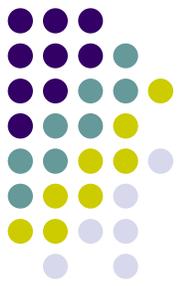
QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.



NERSC is a Research Facility

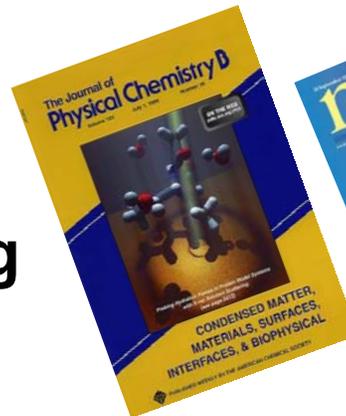
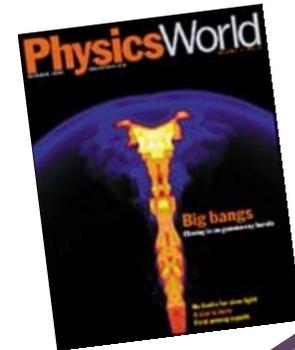
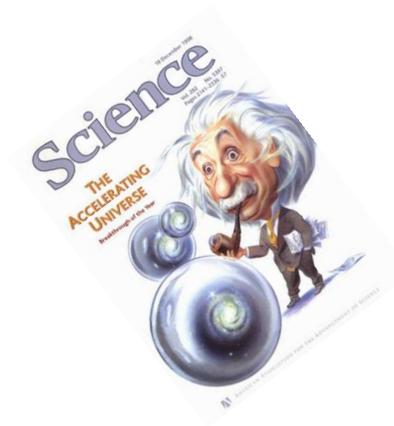
- The National Energy Research Scientific Computing Center (NERSC) is one of the largest facilities in the world devoted to providing computational resources and expertise for basic unclassified scientific research.
- NERSC accelerates scientific discovery through computational science of scale.
- Computational scientists who use NERSC perform basic scientific research across a wide range of disciplines, such as;
 - Climate Modeling
 - Material Science
 - Molecular & Protein Structure
 - Cosmology



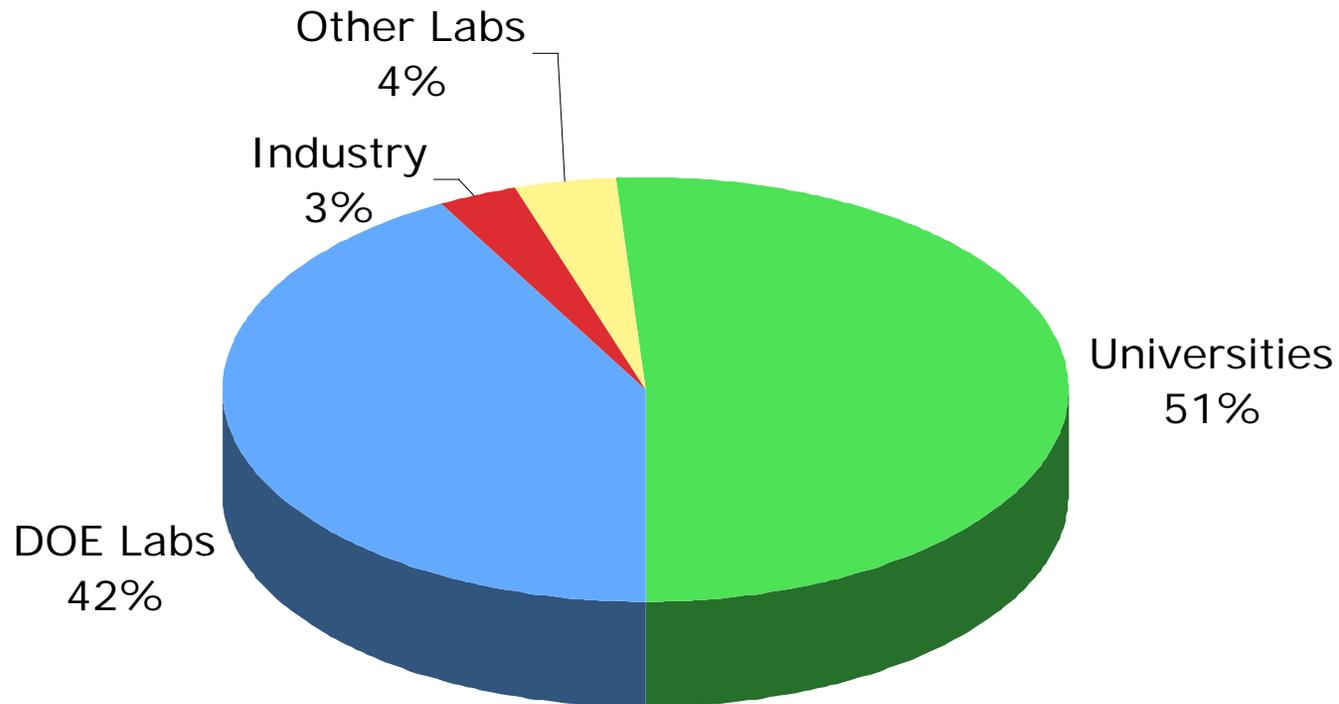


National Energy Research Scientific Computing Center **NERSC**

- Serves the entire scientific community.
- 2978 users in 2006
>300 projects
- 1437 refereed user publications in 2006 citing **NERSC**



NERSC User Demographics



2006

NERSC at Berkeley Lab

- NERSC came to Berkeley Lab in 1996 and was located “on the hill”.
- In 2000, because High Performance Computers (HPC) grew in size, NERSC moved to a larger, leased building in Oakland (20th & Broadway), Oakland Scientific Facility.
- By 2010, NERSC will outgrow the Oakland Scientific Facility.
- The CRT building will be the permanent home for this national user facility.



Computational Research Division

Creates computational tools and techniques that enable scientific breakthroughs, by conducting applied research and development in computer science, computational science, and applied mathematics.

- Data Management
- Distributed Systems
- High Performance Computing Research
 - Material Science
 - Astrophysics & Cosmology
 - Climate
 - Visualization

QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

Simulation Science

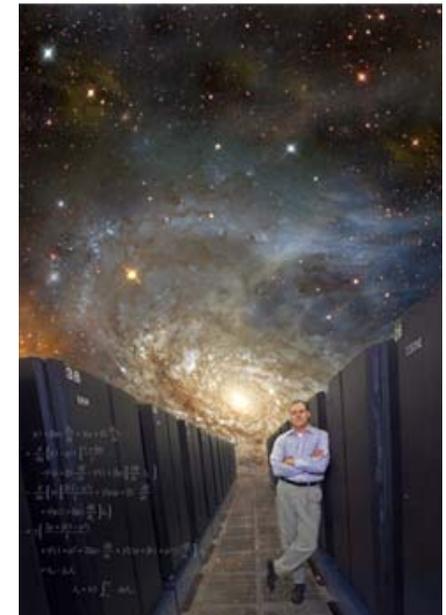
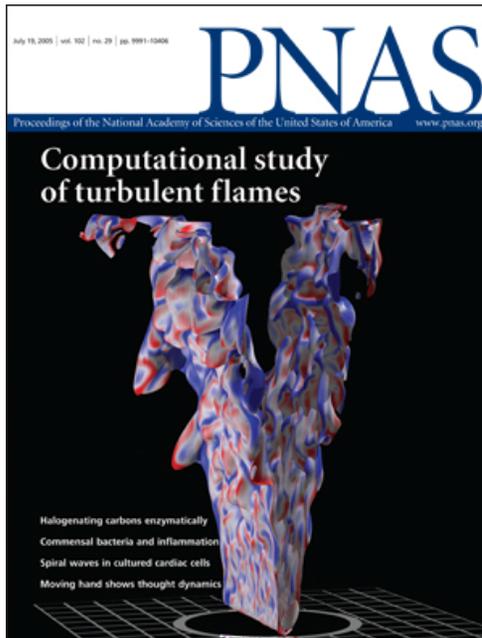
CRT



Theory

Experiment

Simulation





CSE

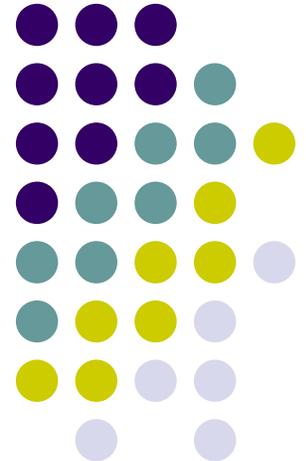
Computational Science & Engineering (CSE):

- Joint program between LBNL and UCB to train students in computational approaches to address scientific and engineering challenges.
- Focus on large team projects of scale that will leverage the Application, computational, and computer science expertise from both institutions.
 - Candidate focal areas are climate, cosmology & computer architecture.
- **Train the next generation of computational scientists**



Climate Modeling

QuickTime™ and a
decompressor
are needed to see this picture.

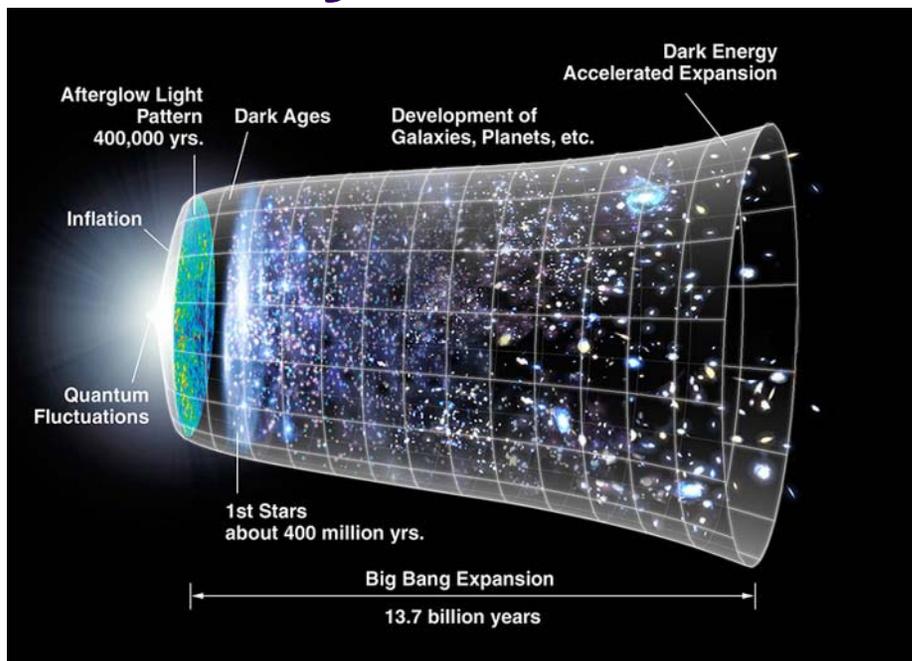




CRT

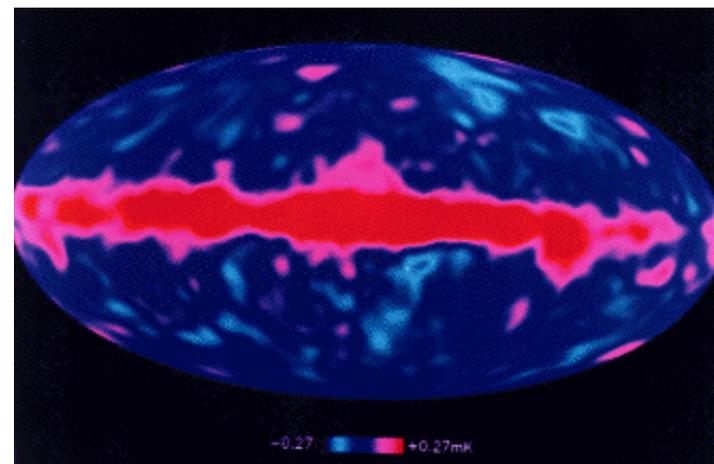


NERSC User George Smoot wins 2006 Nobel Prize in Physics



Mather and Smoot 1992

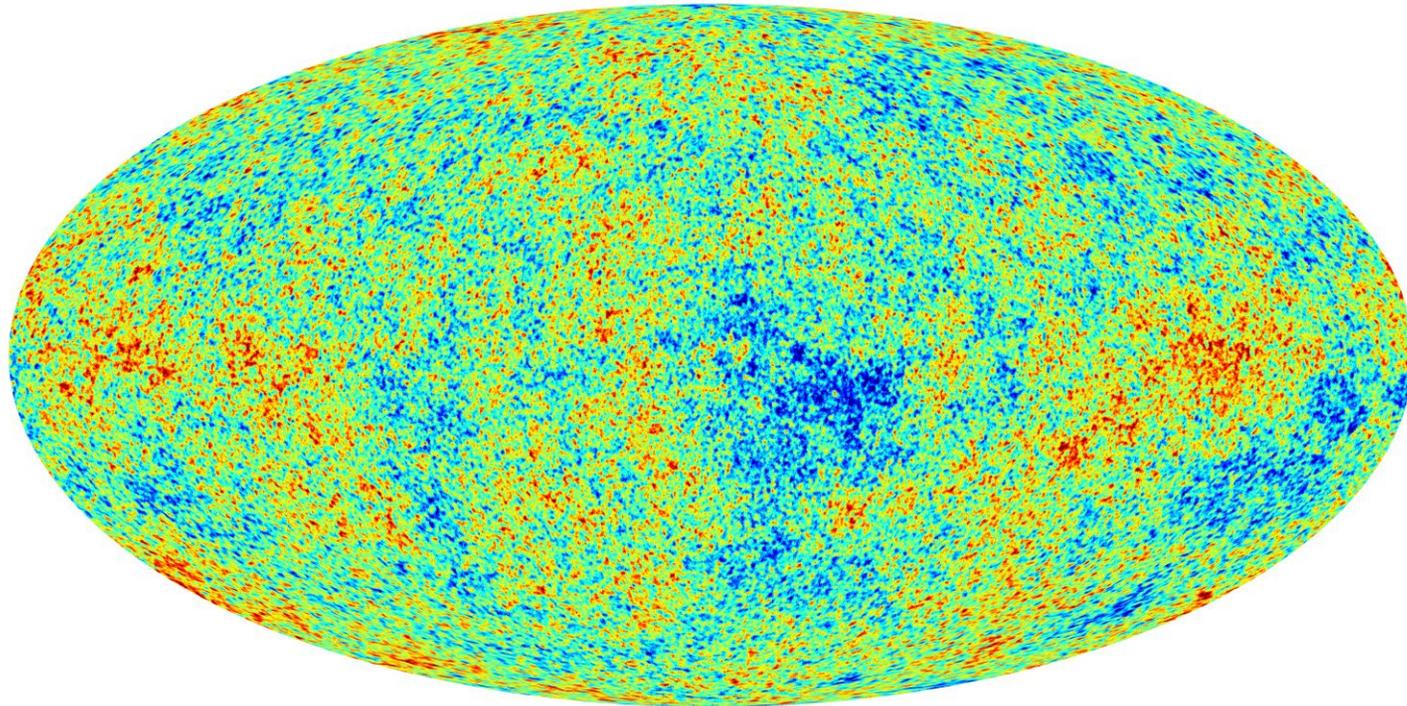
COBE Experiment showed anisotropy of CMB



Cosmic Microwave Background Radiation (CMB): an image of the universe at 400,000 years

The Current CMB Map

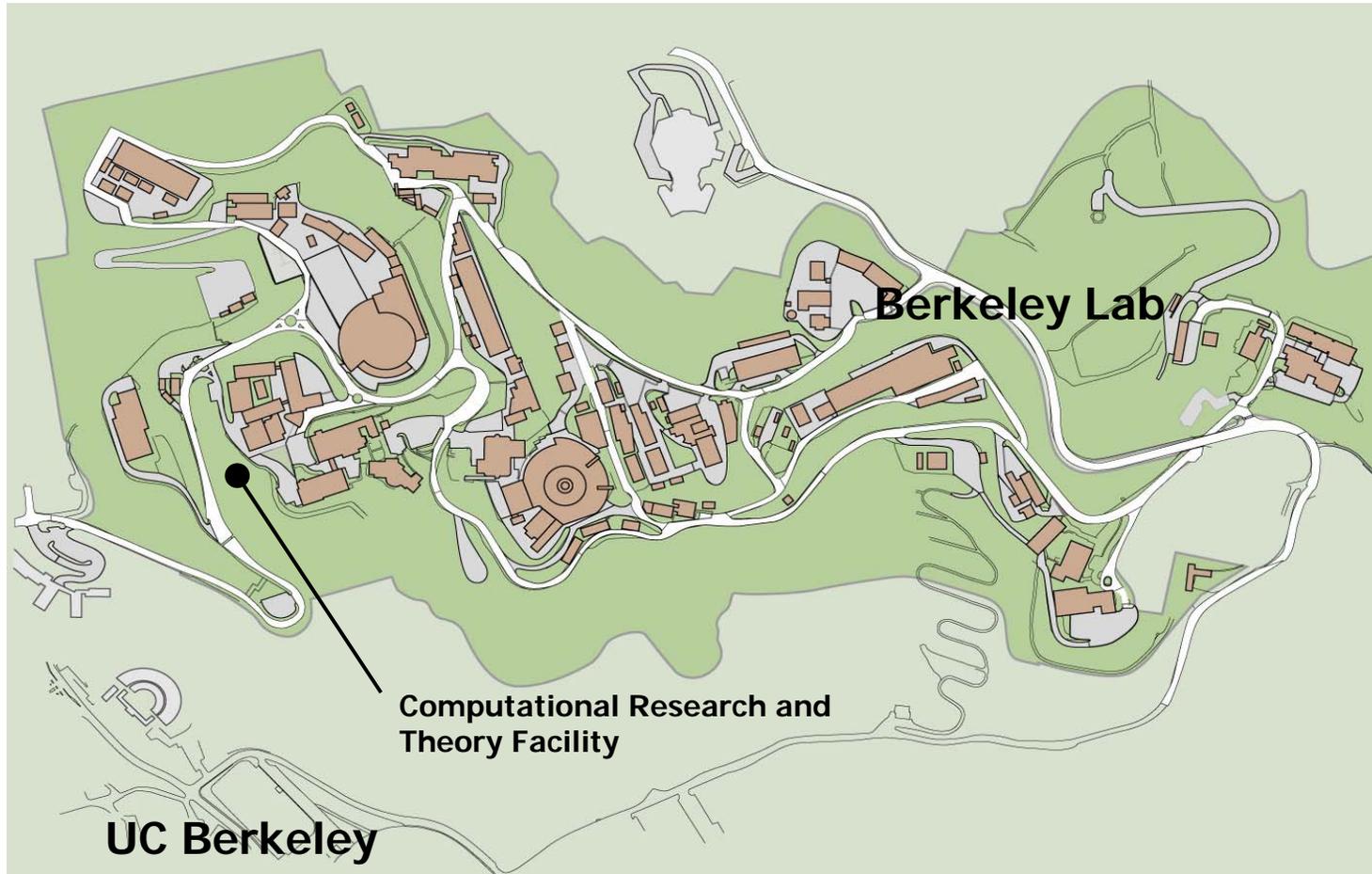
CRT



- Unique imprint of primordial physics through the tiny anisotropies in temperature and polarization.
- Extracting these μ Kelvin fluctuations from inherently noisy data is a serious computational challenge.

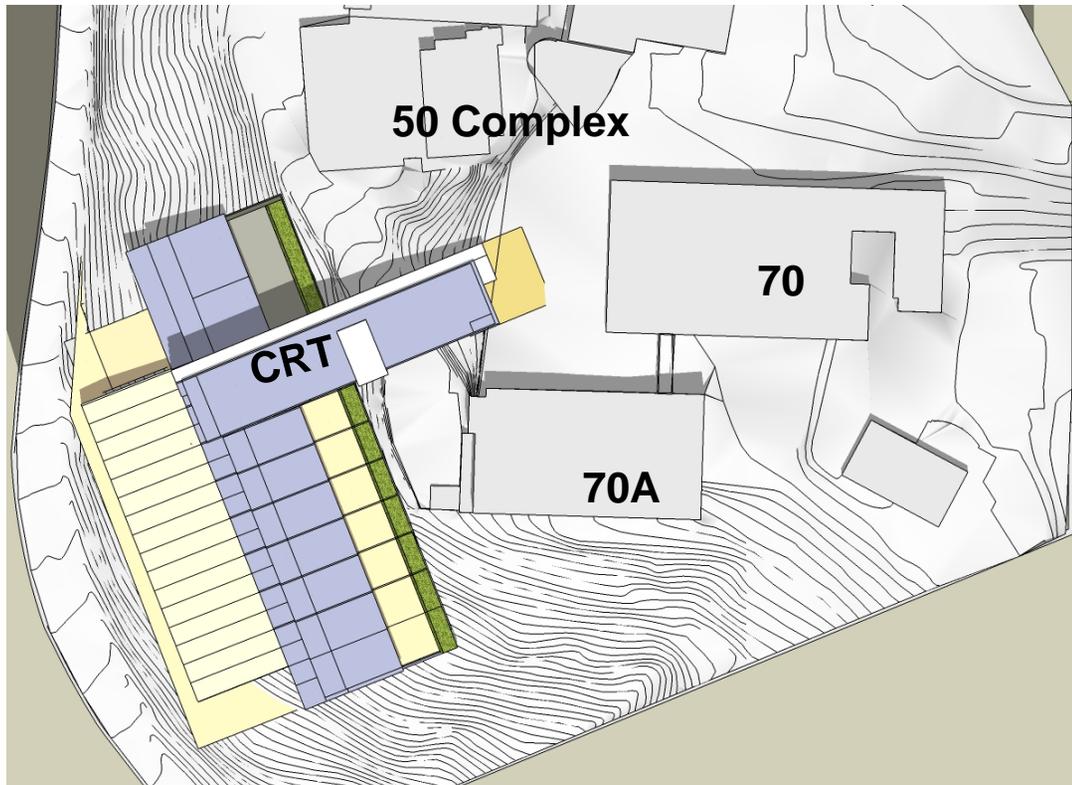


Vicinity Map





Site Plan Study



- Schematic Design Phase
- Sited adjacent to NERSC users and UC Berkeley Campus
- 140,000 GSF
 - Office - 86,000 gsf
 - Computer – 32,000
 - Mechanical – 22,000
- Provide Office Space for 300~ Researchers, Students and Staff



Entry Plaza – Study

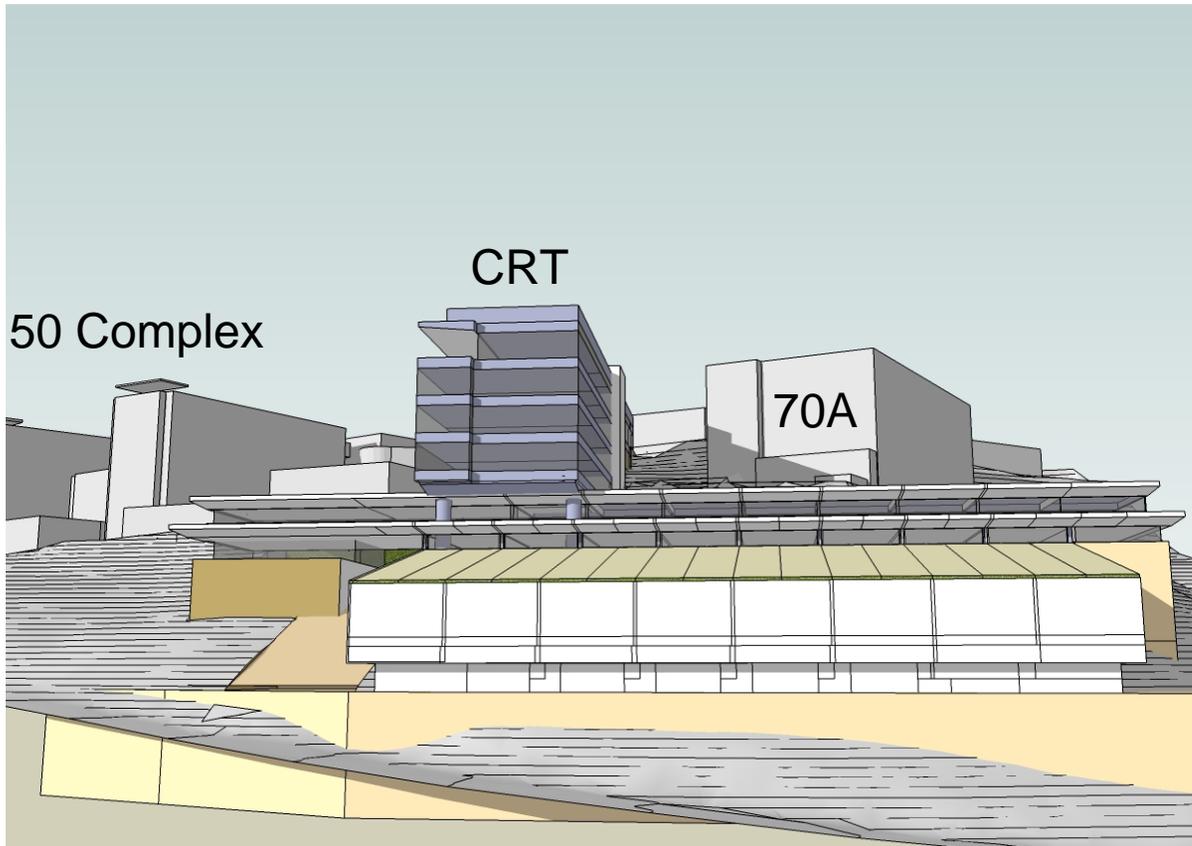
Looking S-W



- East/West Orientation is best for solar shading
- Entrance close to collaborators
- Share 50-Complex auditorium



Elevation – Study Looking East



- Angular computer room roof reduces impact
- Visual appearance similar to existing buildings (50 & 70A)
- We have followed a general theme