Requirements

To apply to the summer school, you must

- Be enrolled in a PhD program at an accredited university in a relevant field of study
- Be available to live and work in Los Alamos, New Mexico for 10 weeks, sometime from mid-May through early September of 2016 (exact dates TBD)

Desired Disciplines

Domain Science
  Astrophysics
  Nuclear Physics

Applied Mathematics
  Hydrodynamics
  Particle Methods (Interacting)
  Numerical Analysis

Computer Science
  Data Structures
  Programming Models
  Task and Data Parallelism

Students will be chosen based both on their qualifications and on the alignment of their skills and interests with the focus area of the summer school. Broadly speaking, we will attempt to create a balanced team with an even distribution of students from the disciplines of physics, applied mathematics, and computer science.

Compensation

Los Alamos National Laboratory offers very competitive compensation:

- 10 week salary of $9-12K (based on education and experience)
- Paid relocation costs

Sponsors

The summer school is funded by the Information Science and Technology Institute (IS&T) and the Advanced Simulationa & Computing (ASC) program.

http://codesign.lanl.gov/summer-school

To apply for the 2016 summer school, please visit our website:

http://codesign.lanl.gov/summer-school

Los Alamos 2016 IS&T/ASC Co-Design Summer School

*This is an experience that is guaranteed to change your life!*

Erin Carrier
2014 University of Illinois

Students will work with some of the leading experts in their respective fields of study to solve cutting edge problems in predictive science, using the most advanced resources available at the institution that invented supercomputing!

In addition to great science, Los Alamos also offers lots of sunny weather for outdoor activities like hiking, biking, rock climbing and running. After you exercise your brain, you will have plenty of time to enjoy the beauty of Northern New Mexico!

Emmanuel Cierin
2013 CEA, France

Los Alamos
NATIONAL LABORATORY
— EST. 1943 —
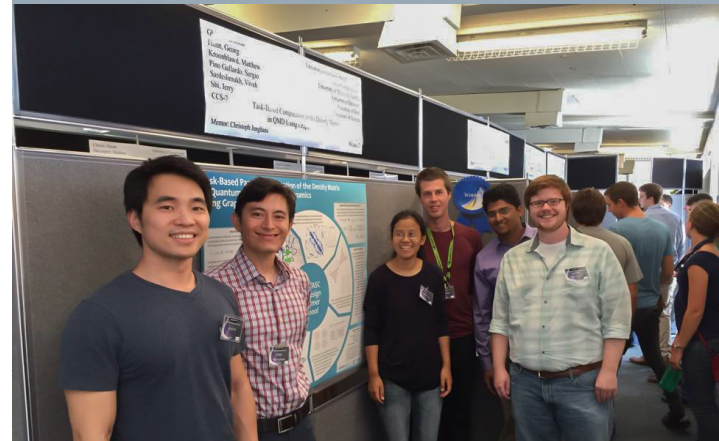
2015 School: Guangjie "Jerry" Shi (UGA), Sergio Pino Gallardo (U. Delaware), Purnima Ghale (UIUC), Georg Hahn (Imperial College London), Vivek Sardeshmukh (U. IOWA) and Matthew Kroonblawd (U. Missouri)

What is the Co-Design Summer School?

The Los Alamos IS&T/ASC Co-Design Summer School was created to train future scientists to work on the kinds of interdisciplinary teams that are demanded by today's challenges. Launched in 2011, the summer school recruits top candidates in a range of fields spanning domain sciences, applied mathematics, computational and computer sciences, and computer architecture. Participants work together to solve a focused problem that is designed to build the skills needed to tackle the grand challenges of the future. Foremost among the skills on which we focus is the ability of students to work across disciplines with other team members, while employing their own unique expertise. This is the heart of Co-Design.

What exactly is Co-Design?

Co-Design is the social and technical equivalent of a multiple-constraint optimization problem. The rapid evolution of computing architectures and the expanding space between specializations in domain science and computer architecture means that it is impossible for a single individual to cover all of the skills needed to solve current-day computational science challenges. Co-Design bridges this space through interactions between members of an interdisciplinary team. With the right amount of overlap, team members can communicate with each other effectively to solve a problem.

2016 Co-Design Summer School Focus: Astrophysics - Kilonovae

Neutron star mergers are the primary targets for the advanced gravity wave (GW) detectors (LIGO, VIRGO) that are coming into operation in the next few years, with estimated detection rates of several events per year. However, because of the poor directional sensitivity of GW detectors, we will remain blind to these mergers unless they are accompanied by a short gamma-ray burst. Such bursts only occur in a small percentage of mergers, where the merger axis is oriented towards the Earth. Recently, new types of electromagnetic transients have been proposed: kilonovae. These transients emit iostropically, meaning that they can aid in detecting mergers of any orientation. Powered by the decay of heavy r-process elements (synthesized in the merger ejecta), kilonovae can peak in the infrared or visual bands on the timescale of a few days.
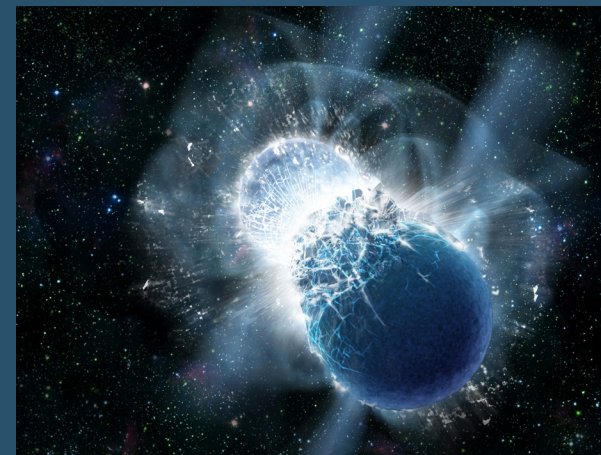
To gain a better theoretical understanding of kilonovae, the 2016 summer school will create simulation tools to investigate several properties that will constrain the observations:

Ejecta Mass
The amount of mass ejected through different channels (dynamical, neutrino-driven winds, viscous winds).

Ejecta Morphology
The structural form of the ejecta.

Ejecta Composition
The relative densities of the various heavy r-process elements that are synthesized in the ejecta.

This investigation will require the development of new numerical methods and computational science strategies to enable large-scale simulation runs on advanced computing architectures. In particular, we will focus on refactoring the 2HOT smoothed particle hydrodynamics code—developed by Michael S. Warren, Nuclear and Particle Physics, Astrophysics and Cosmology (T-2)—to use modern task-based and functional programming model implementations for scalable execution on the most recent HPC systems available.