

University of California
High-Performance
AstroComputing Center

UC-HIPACC

JOEL PRIMACK

UCSC



The University of California High-Performance AstroComputing Center

A consortium of nine UC campuses and three DOE laboratories

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Deep field image of the Andromeda Galaxy created by co-adding 423 images.

At the National Energy Research Scientific Computing Center (NERSC), Peter Nugent (LBNL) and his colleagues combine Astrocomputing with observation to study dark energy in the Universe.

News /Announcements

Welcome to the new UC High-Performance AstroComputing Center (HIPACC) website!

- Announcing the 2011 International Astro-Computing Summer School on Computational Explosive Astrophysics. Now accepting applications! [\[more\]](#)
- View UC HIPACC's Annual Report for 2010 [here](#).

Quick Links

- The 2010 International Summer School on AstroComputing focused on Galaxy Formation [\[more\]](#)
- The Future of AstroComputing conference was held on Dec 16 & 17 at the San Diego Supercomputer Center. View the conference website [\[here\]](#)

place the cursor over the image to pause the slideshow

<http://hipacc.ucsc.edu/>

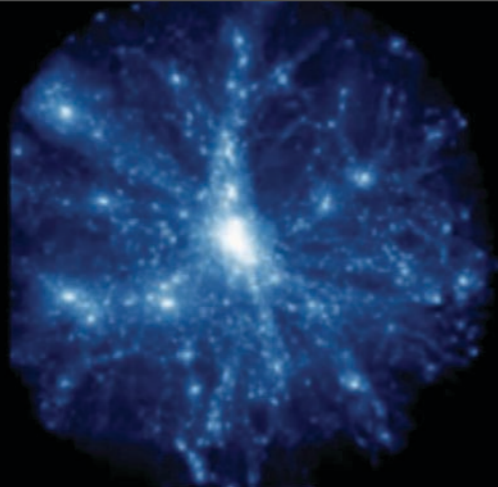
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As computing and observational power continue to increase rapidly, the most difficult problems in astrophysics are now coming within reach of simulations based on solid physics, including the formation and evolution of stars and supermassive black holes, and their interactions with their galactic environments.

The purpose of HIPACC is to realize the full potential of the University of California's worldleading computational astrophysicists, including those at the affiliated national laboratories. HIPACC will do this by fostering their interaction with each other and with the rapidly increasing observational data, and by empowering them to utilize efficiently the new supercomputers with hundreds of thousands of processors both to understand astrophysical processes through simulation and to analyze the petabytes and soon exabytes of data that will flow from the new telescopes and supercomputers. This multidisciplinary effort links theoretical and observational astrophysicists, physicists, earth and planetary scientists, applied mathematicians, and computer scientists on all nine UC academic campuses and three national labs, and exploits California's leadership in computers and related fields.

HIPACC's outreach activities will include developing educational materials, publicity, and websites, and distribution of simulation outputs including visualizations that are beautiful as well as educational.



The University of California
High-Performance AstroComputing Center
A consortium of nine UC campuses and three DOE laboratories

UC-HIPACC Leadership

Executive Committee

Director: Joel Primack (UCSC) <joel@ucsc.edu>

Coordinator from Northern California: Peter Nugent (LBNL)

Coordinator from Southern California: Michael Norman (UCSD)

Council

UC Berkeley: Christopher McKee

UC Davis: TBA

UC Irvine: James Bullock

UC Los Angeles: Steve Furlanetto

UC Merced: TBA

UC Riverside: Gillian Wilson

UC San Diego: Michael Norman

UC Santa Barbara: S. Peng Oh

UC Santa Cruz: Sandra Faber

Los Alamos National Lab: Salman Habib

Lawrence Berkeley National Lab: Peter Nugent

Lawrence Livermore National Lab: Peter Anninos

UC-HIPACC Staff

UC-HIPACC Office Manager: Coral Connor <hipacc@ucsc.edu>

Visualization and Outreach Specialist: Nina McCurdy <nmccurdy@ucsc.edu>

Senior Writer - Publicity and Proposals: Trudy Bell <t.e.bell@ieee.org>

Annual Conferences in Northern and Southern California

HIPACC will sponsor two large meetings each year especially (but not exclusively) for scientists working on computational astrophysics and related topics at the UC campuses and labs. Unlike the more specialized meetings of working groups, we expect that these larger meetings will be broad, with the purpose of bringing theoretical astrophysicists together with computer science specialists, computer hardware experts, and observational astronomers. One meeting will be in northern California and the other in southern California to promote maximum participation. In addition to sharing new information, these meetings will highlight problems needing attention to advance the state-of-the-art and introduce participants to potential colleagues and begin collaborations.

Annual International AstroComputing Summer Schools

HIPACC will support an annual school aimed at graduate students and postdocs who are currently working in, or actively interested in doing research in, AstroComputing. Topics and locations of the annual school will rotate, and Caltech and Stanford are also welcome to participate.

The 2010 school was at UCSC, on the topic of Hydrodynamic Galaxy Simulations. Lectures were presented by experts on the leading codes (AMR codes ART, Enzo, and RAMSES, and SPH codes Arepo, GADGET, and Gasoline) and the Sunrise code for making realistic visualizations including stellar SED evolution and dust reprocessing. There were 60 students, including 20 from outside the USA. Lecture slides and videos, codes, inputs and outputs are on the UC-HIPACC website <http://hipacc.ucsc.edu>. Funding from NSF helped to support non-UC participant expenses.

The 2011 school is July 11-23 at UC Berkeley/LBNL/NERSC, on the topic of Computational Explosive Astrophysics: novae, SNe, GRB, and binary mergers. The scientific organizers are Daniel Kasen (LBNL/UCB) and Peter Nugent (LBNL).

The 2012 school will be at UC San Diego/SDSC, on Astrophysical Data Mining and AstroINformatics. . The scientific director is Alex Szalay (Johns Hopkins) and the host is Michael Norman, director, SDSC.

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The 2010 school was at UCSC, on the topic of Hydrodynamic Galaxy Simulations





The Future of AstroComputing
UC-HIPACC Conference December 2010 at SDSC

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COMPUTATIONAL EXPLOSIVE ASTROPHYSICS

UC HIPACC's 2011 International Summer School on AstroComputing

Dates: July 18 – July 29, 2011

Location: University of California Berkeley/ Lawrence Berkeley National Lab/
National Energy Research Scientific Computing Center

Description: This year's summer school will focus on computational explosive astrophysics, including the modeling of core collapse and thermonuclear supernovae, gamma-ray bursts, compact object mergers, and other energetic transients. Lectures will include instruction in the physics and numerics of multi-dimensional hydrodynamics, general relativity, radiation transport, nuclear reaction networks, neutrino physics, and equations of state. Workshops will guide students in running and visualizing simulations on supercomputers using codes such as FLASH, CASTRO, GR1D and modules for equations of state, nuclear burning, and radiation transport.

Scientific Organizers: Daniel Kasen and Peter Nugent (UCB & LBNL)

Lecturers and main workshops will include:

Ann Almgren (LBNL) - CASTRO
Alan Calder (Stony Brook) - FLASH
Hank Childs (NERSC) - VisIt
Christian Ott (Caltech) and Erik Schnetter (LSU) - GR1D/Cactus
Frank Timmes (Arizona State) - Equation of state, reaction network modules

Additional lecturers and topics will include:

Katie Antypas (NERSC) - Using NERSC
George Fuller (UC San Diego) - neutrino physics
Daniel Kasen (UC Berkeley) - radiation transport
Andrew MacFadyen (NYU) - MHD, gamma-ray bursts
Eliot Quataert (UC Berkeley) - compact object mergers
Enrico Ramirez-Ruiz (UC Santa Cruz) - tidal disruptions, collisions
Stan Woosley (UC Santa Cruz) - thermonuclear supernovae
Jim Lattimer (Stony Brook) - nuclear equation of state

Other Details:

Housing: Students will be staying at Stern Hall on the UC Berkeley campus (\$64/night).

Registration for the summer school will be \$250. Payment will be required at the time of acceptance. **Aid:** UC HIPACC will cover lodging and travel expenses for UC students, and some financial assistance may be available for other students.

For more information and to apply, visit us on the web:

<http://hipacc.ucsc.edu/ISSAC2011.html>

Announcing the 2011 UC-HIPACC International AstroComputing Summer School on Computational Explosive Astrophysics

Topics Include: supernovae, gamma-ray bursts, compact object mergers, energetic transients

Location: University of California, Berkeley/ Lawrence Berkeley
National Lab/ National Energy Research Scientific Computing Center

Dates: July 18 – July 29, 2011

Organizers: Daniel Kasen & Peter Nugent (UCB/LBNL)

Description: The University of California High-Performance Astro-Computing Center (UC-HIPACC) is pleased to announce the continuation of its international summer school, to be held this year by UC Berkeley and LBNL from July 18-29, 2011. This year's summer school will focus on computational explosive astrophysics, including the modeling of core collapse and thermonuclear supernovae, gamma-ray bursts, neutron star mergers, and other energetic transients. Lectures will include instruction in the physics and numerical modeling of multi-dimensional hydrodynamics, general relativity, radiation transport, nuclear reaction networks, neutrino physics, and equations of state. Afternoon workshops will guide students in running and visualizing simulations on supercomputers using codes such as FLASH, CASTRO, GR1D and modules for nuclear burning and radiation transport. All students will be given accounts and computing time at NERSC and have access to the codes and test problems in order to gain hands on experience running simulations at a leading supercomputing facility.

<http://hipacc.ucsc.edu/>

Funding Opportunities

Calls for proposals scheduled twice annually for Fall/Winter & Spring/Summer funding Cycles.

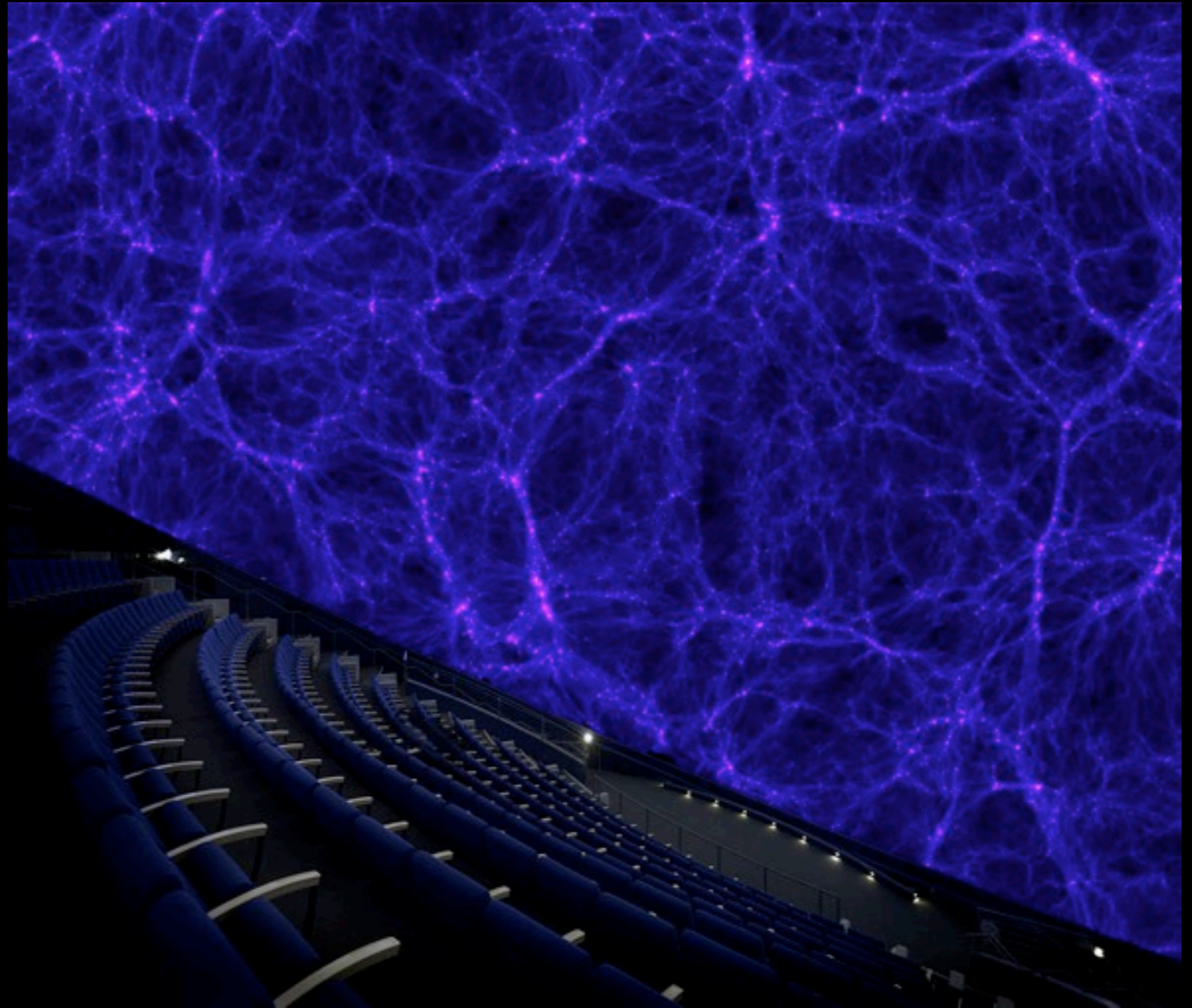
UC-HIPACC will support focused working groups of UC scientists from multiple campuses to pursue joint projects in computational astrophysics and related areas by providing funds for travel and lodging. At the heart of UC-HIPACC are working groups.

1. **Small travel grants enable scientists, graduate students, and post-doctoral students to travel easily and spontaneously between Center nodes.** UC-HIPACC will fund travel grant proposals submitted by faculty members, senior scientists, postdocs or graduate students up to \$1000 on a first-come-first-served basis with a simple application describing the plan and purpose of the travel.
2. **Grants ranging between \$1000 - \$5,000 to support larger working groups or participation in scientific meetings.**
3. **Mini Conference grants of up to \$5,000 to support collaborations of multiple UC campuses and DOE labs.**
4. **Grants to faculty to support astrocomputing summer research projects by undergraduates.**
5. **Matching grants of up to \$10,000 for astrocomputing equipment.**
6. **Innovative initiative proposals for other purposes that are consistent with the goals of UC-HIPACC. Such purposes could include meetings or workshops, software development, or education and outreach.**

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Astro-Computation Visualization and Outreach

Project lead: Prof. Joel Primack, Director, UC High-Performance AstroComputing Center
UC-HIPACC Visualization and Outreach Specialist: Nina McCurdy



HIPACC is working with the Morrison Planetarium at the California Academy of Sciences (pictured here) to show how dark matter shapes the universe. We are helping prepare their planetarium show opening fall 2010, and also working on a major planetarium show to premiere at the Adler Planetarium in spring 2011.

Galaxy Merger Simulation

Run on Columbia Supercomputer at NASA Ames Research Center.
Dust simulated using the Sunrise code (Patrik Jonsson, UCSC/Harvard).



Astronomical observations represent snapshots of particular moments in time; it is effectively the role of astrophysical simulations to produce movies that link these snapshots together into a coherent physical theory.

Showing Galaxy Merger simulations in 3D will provide a deeper, more complete picture to the public and scientists alike.



If you want a copy, ask
hipacc@ucsc.edu

TRT 01:31:19

Aired: 9:00 PM on October 24th, 2010

 NATIONAL GEOGRAPHIC CHANNEL

INSIDE THE MILKY WAY



Including interviews with Astronomers Tom Abel, James Bullock,
Richard Ellis, Alex Filippenko, Andrea Ghez, Robert Kirshner,
Avi Loeb, Geoff Marcy, Joel Primack, and Seth Shostak
Director/Producer: Duncan Copp, DOX Productions Ltd.

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Finally, I'd like to show you two visualizations:

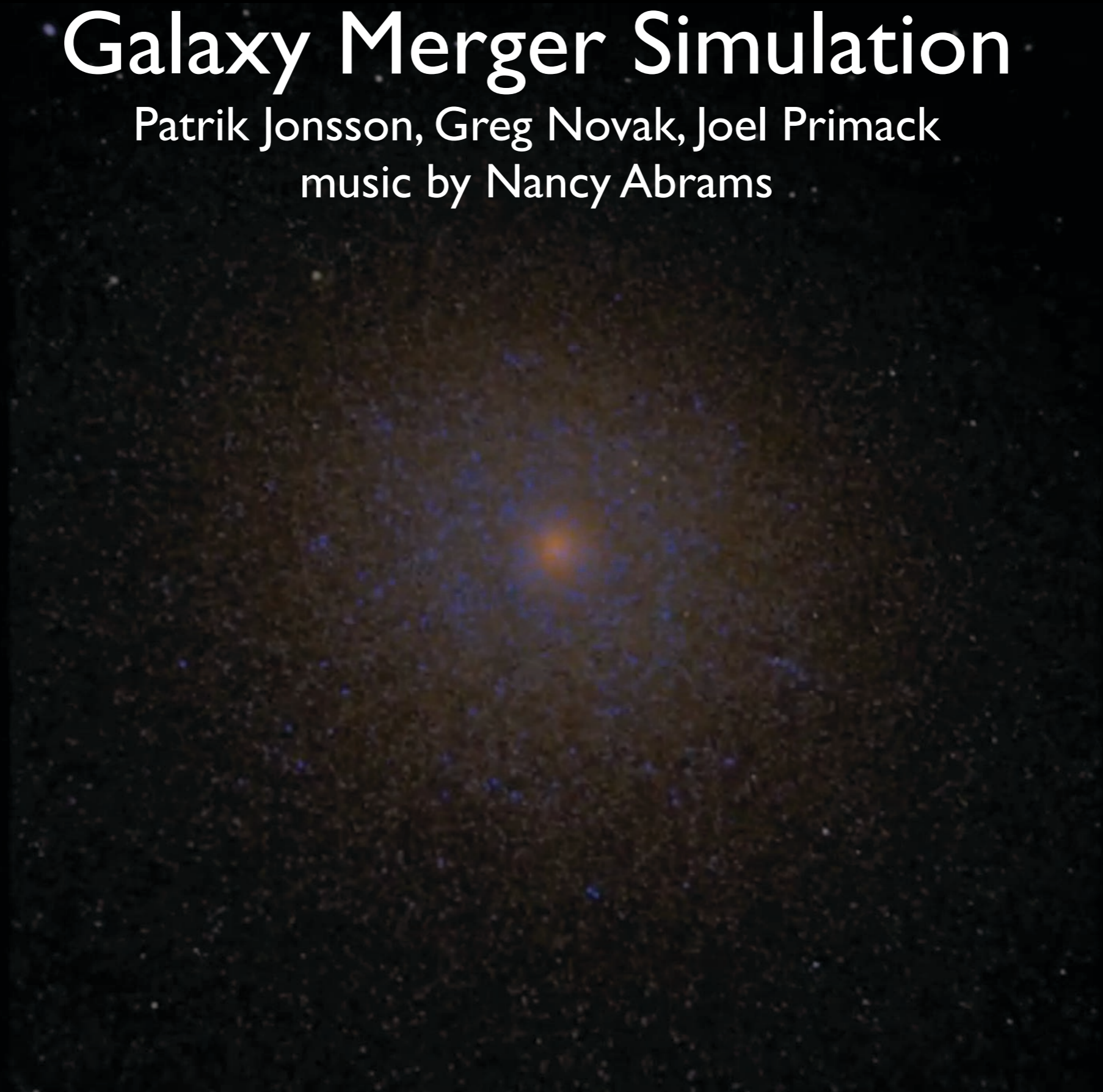
1. Merging spiral galaxies, with stellar evolution and dust scattering, absorption, and re-emission of light included.

2. The Constrained Local Universe Simulation: evolution of a 64 Mpc/h region of the universe including the Milky Way and Virgo Supercluster.

Galaxy Merger Simulation

Patrik Jonsson, Greg Novak, Joel Primack

music by Nancy Abrams



CONSTRAINED LOCAL UNIVERSE SIMULATION



Virgo Cluster



MW & M31



Fornax Cluster