Astronomy: The Stars and Beyond Research

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Carl Haster

- Assistant Professor - Astrophysics
- Department of Physics and Astronomy
- Email: carl.haster@unlv.edu
- Website: cjhaster.com
- Office: BPB 212

Expertise

- Gravitational Wave Astrophysics
- Tests of General Relativity
- Compact Objects – Black Holes and Neutron Stars
- Multi-Messenger Astrophysics

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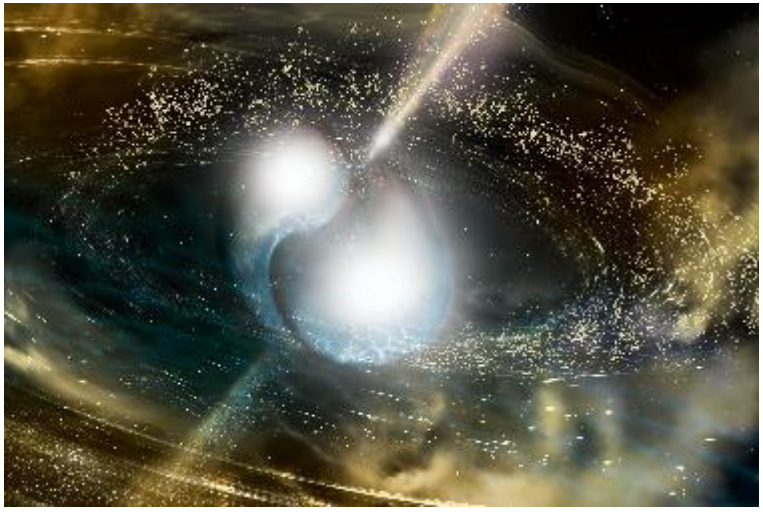
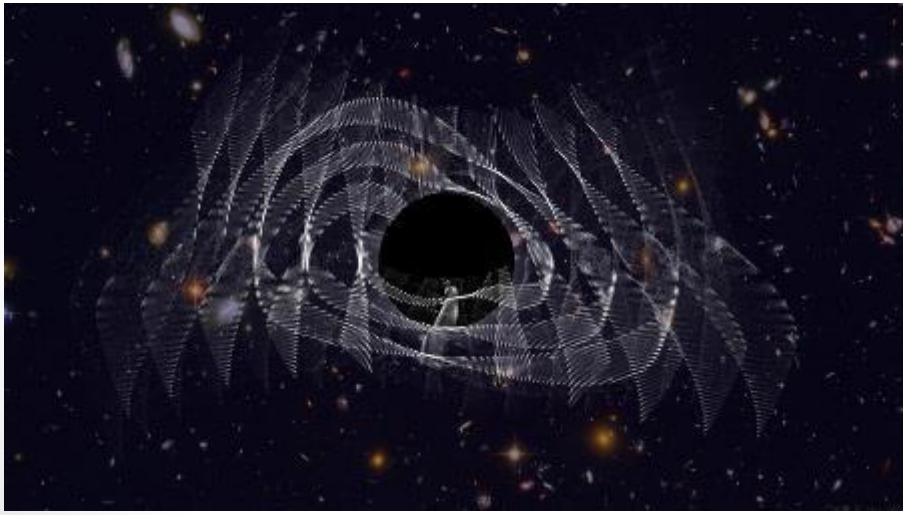
Gravitational Wave Astrophysics

By observing ripples in spacetime, it is possible to study the absolute extremes of the Universe.

This can teach us about the life and death of stars, the evolution of the Universe and the nature of gravitation itself.





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Stephen Lepp

- Professor of Astrophysics, Department of Physics and Astronomy
- Ph.D., Physics, University of Colorado, Boulder
- BPB 234, Stephen.Lepp@unlv.edu
- http://www.physics.unlv.edu/~lepp/

Areas of Expertise

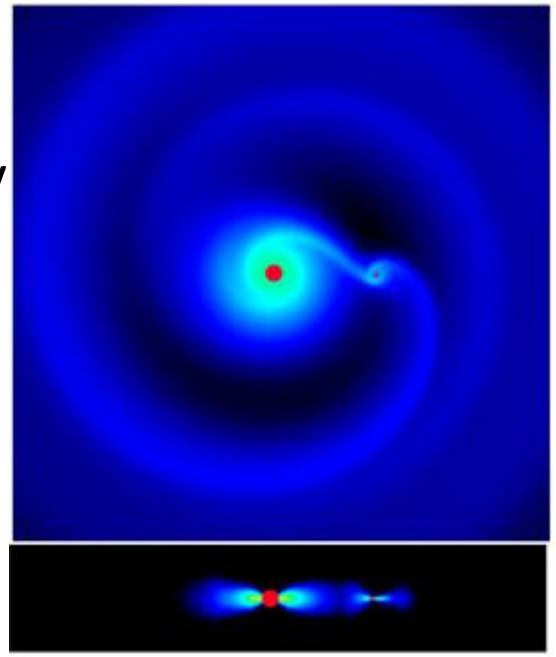
- Astrochemistry
- Interstellar Medium
- SN1987A
- Formation of first objects in the Early Universe
- Thermal Phases in Astrophysics
- X-ray chemistry

Research Summary:

I work primarily at the intersection of Atomic and Molecular Physics with Astrophysics. Making models of astronomical environments to further our understanding of them. I have modeled: interstellar clouds, star forming regions, active galactic nuclei, SN1987A, and the Early Universe.

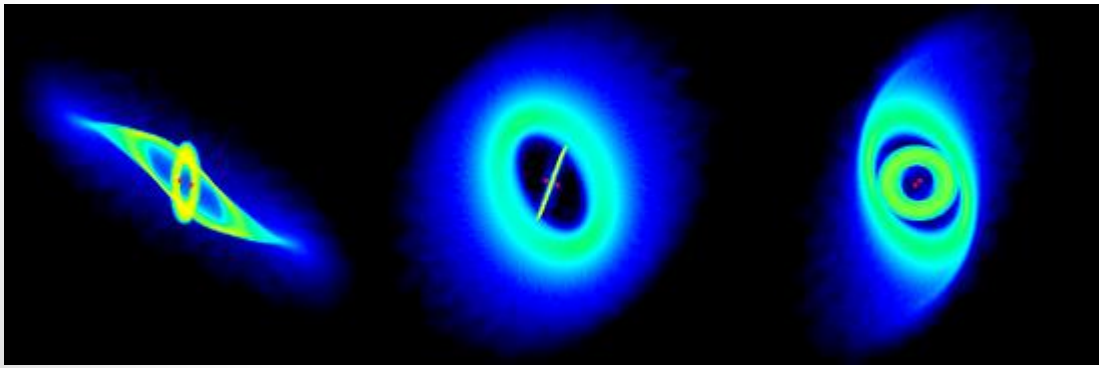
Rebecca Martin

- Professor of Astronomy
- BPB 233
- Department of Physics and Astronomy
- Email: Rebecca.martin@unlv.edu



Expertise

- Star and planet formation
- Astrophysical Fluids
- Binary Star Systems
- Planetary System Dynamics



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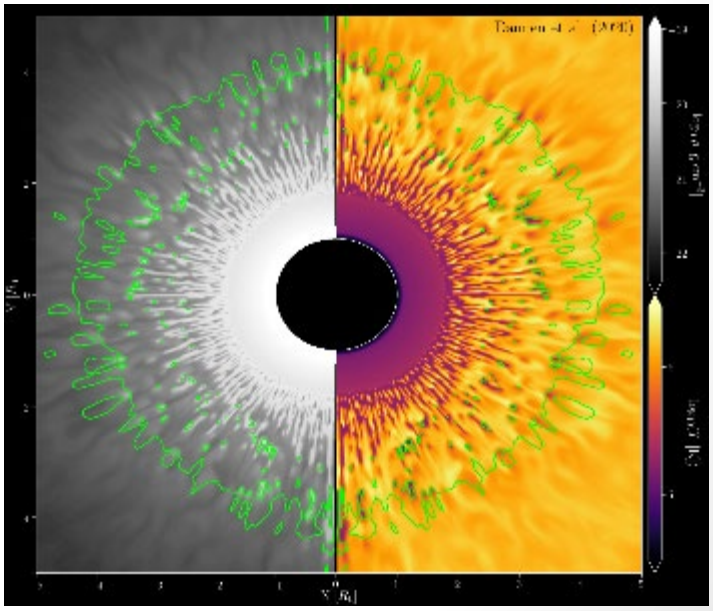
Active Galactic Nuclei

Dr. Daniel Proga

Department of Physics and Astronomy

Phone: (702) 895 3507

Email: dproga@physics.unlv.edu



Expertise:

Radiation-Magnetohydrodynamics

Accretion Physics

Radiation Transfer & Photoionization

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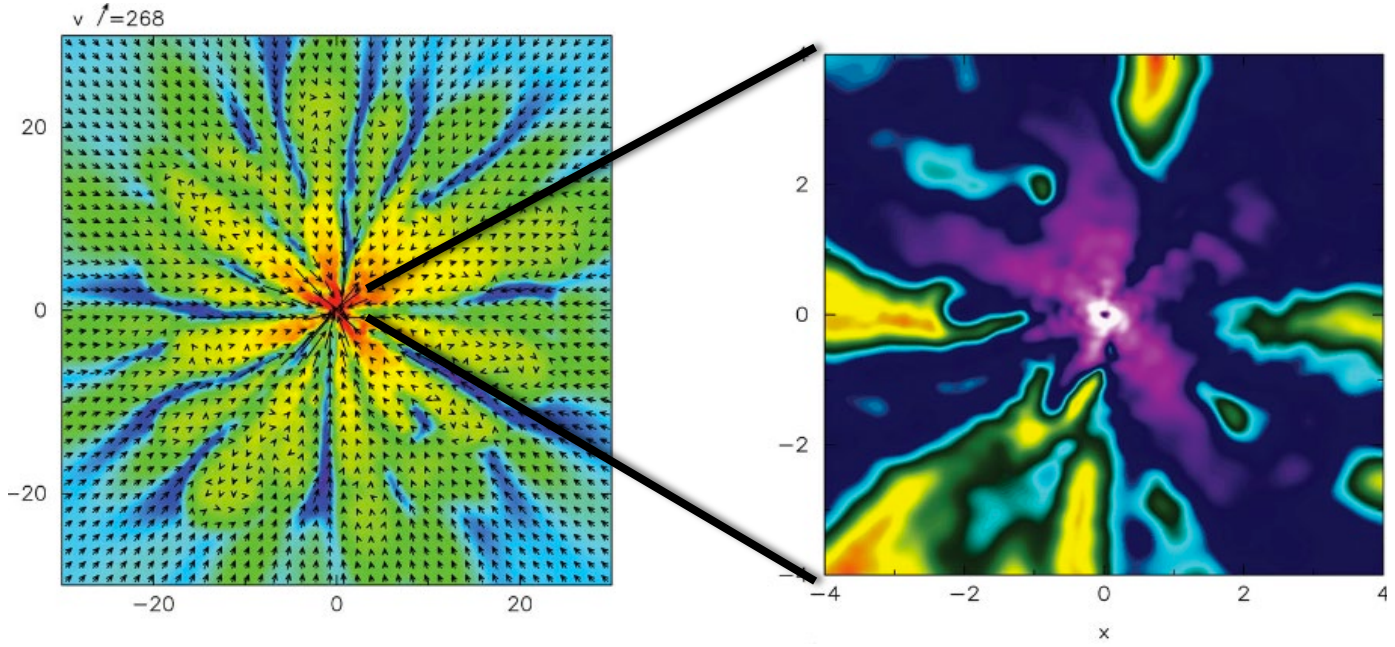
Radiation-hydrodynamic simulations of black hole accretion and related outflows



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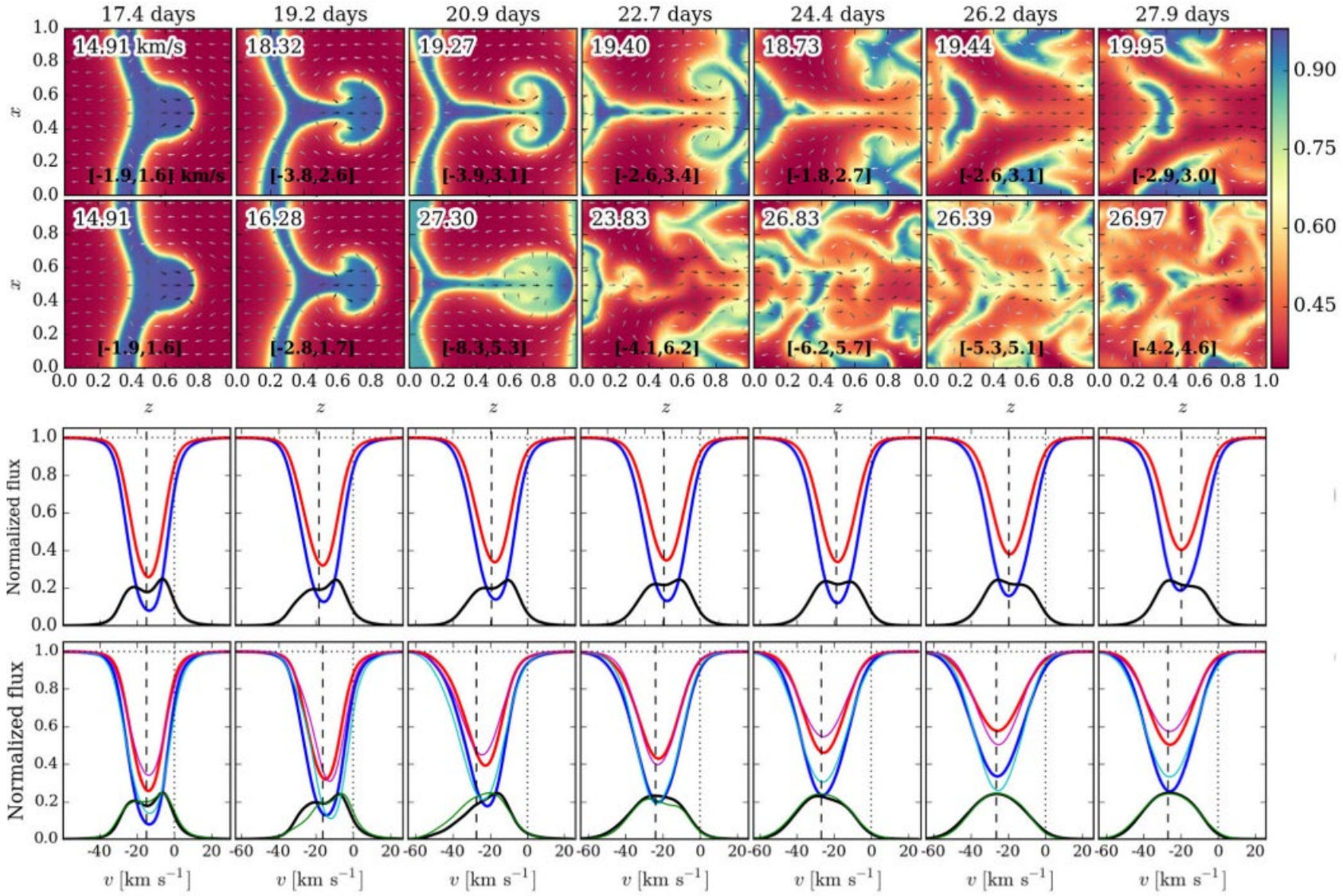
Generated absorption spectra from simulations



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Climate Change; Renewable Energy; Astronomy

Dr George Rhee

Department of Physics and Astronomy

Phone: (702) 895-4453

email: grhee@physics.unlv.edu

“Expertise:”

Observational Astronomy/Cosmology

Renewable Energy

Colorado River flow projections

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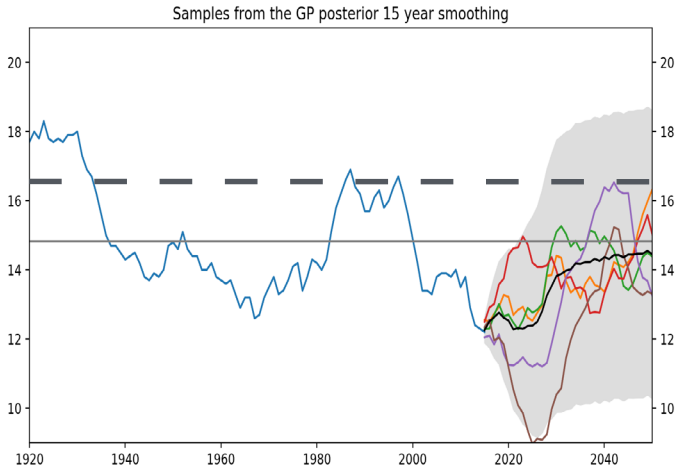
Climate Change

River flow projections using statistics from tree ring data from the upper Colorado River Basin. Gaussian processes with known covariance can be used to predict properties of river flows. Figure shows predictions for Colorado river flow 2015-2050.



Astrophysics

Interested in:

Dark matter distribution in galaxies inferred from the rotation of neutral hydrogen gas in disks

Properties of galaxies in extreme low density environments (voids)

Measuring the masses of black holes using the variability of the central region in Seyfert galaxies and quasars. spectral and brigtness measurements

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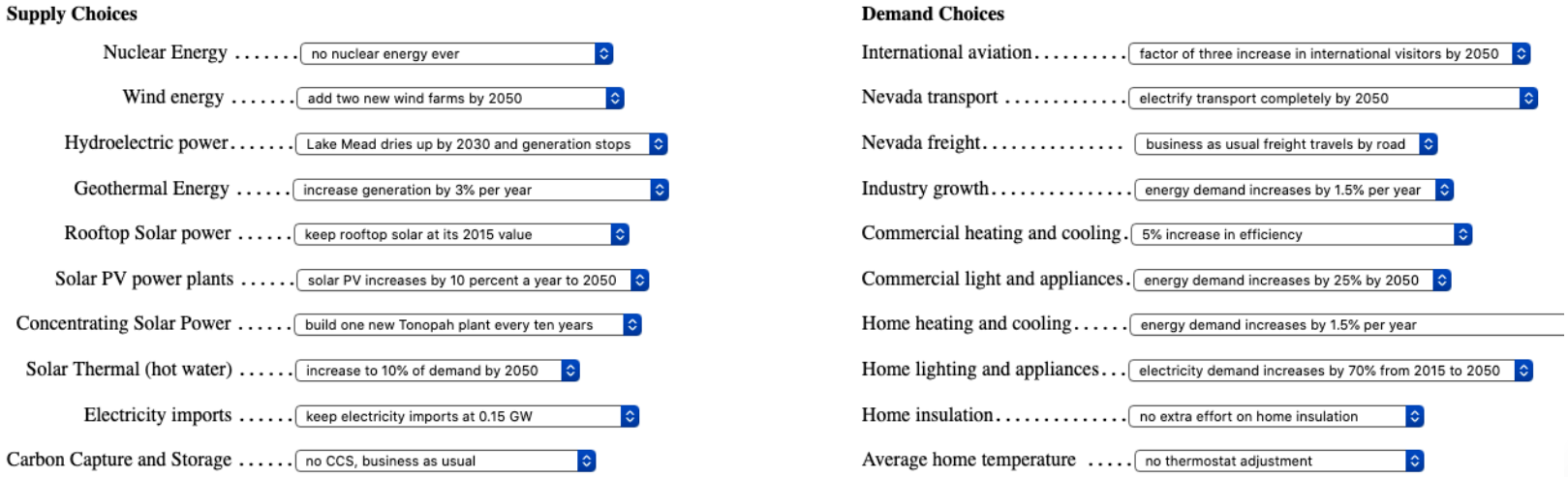
Renewable Energy

Created an online calculator allowing the user to choose supply and demand options to make plans to zero out emissions in Nevada by 2050. http://nv2050.physics.unlv.edu/. I

Interview on KPNR and writeup describing the idea: https://knpr.org/desert-companion/2018-12/do-math



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Research Group of Dr. Steffen

- **Dr. Jason H. Steffen**
- Associate Professor
- Department of Physics and Astronomy
- Email: jason.steffen@unlv.edu
- Website: jasonhsteffen.com

Expertise

- Understanding the properties of extrasolar planets and planetary systems
- Planetary dynamics
- Planet interior modeling
- Composition of planet-forming materials

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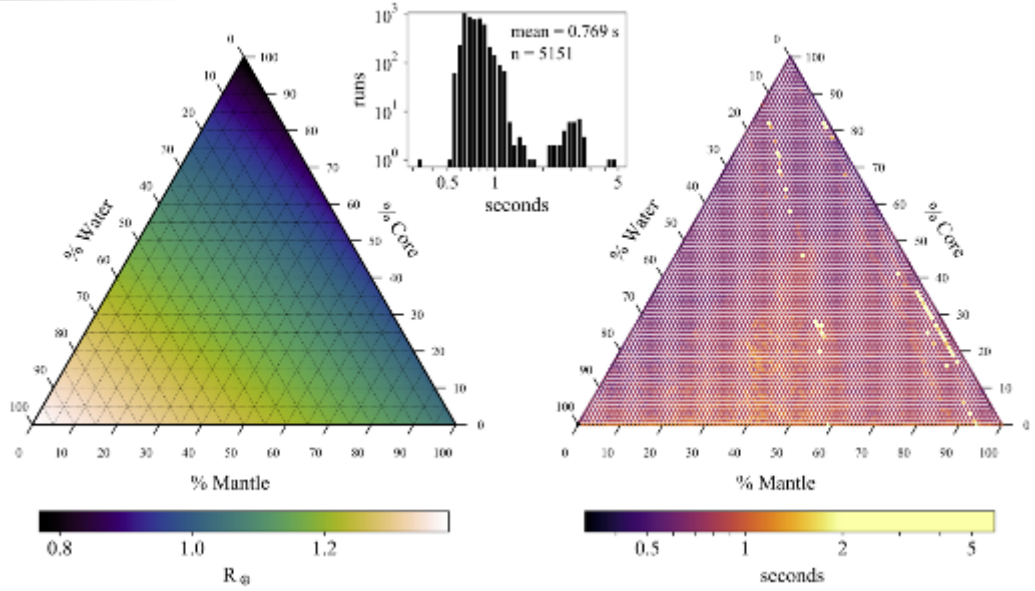
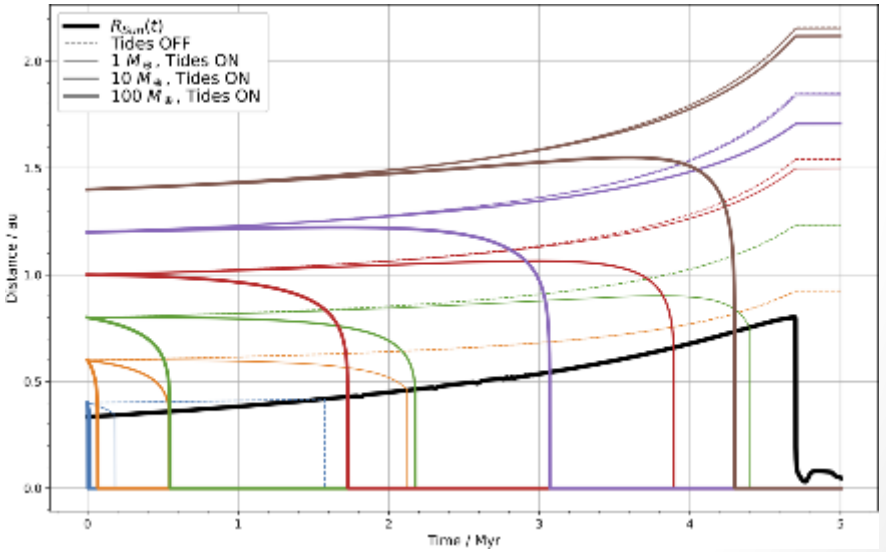


Timing results for planet models using the MAGRATHEA code, developed by our group at UNLV.

Future of planets in a system during the late stages of stellar evolution, including the effects of tides and stellar mass loss.



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Multi-Messenger High Energy Astrophysics

Dr. Bing Zhang
Department of Physics and Astronomy
Phone: (702)895-4050
Email: zhang@physics.unlv.edu, bing.zhang@unlv.edu

Expertise:

Theoretical astrophysics

Transients (gamma-ray bursts, fast radio bursts, etc) astrophysics

Multi-messenger (EM, gravitational waves, neutrinos, etc) astrophysics

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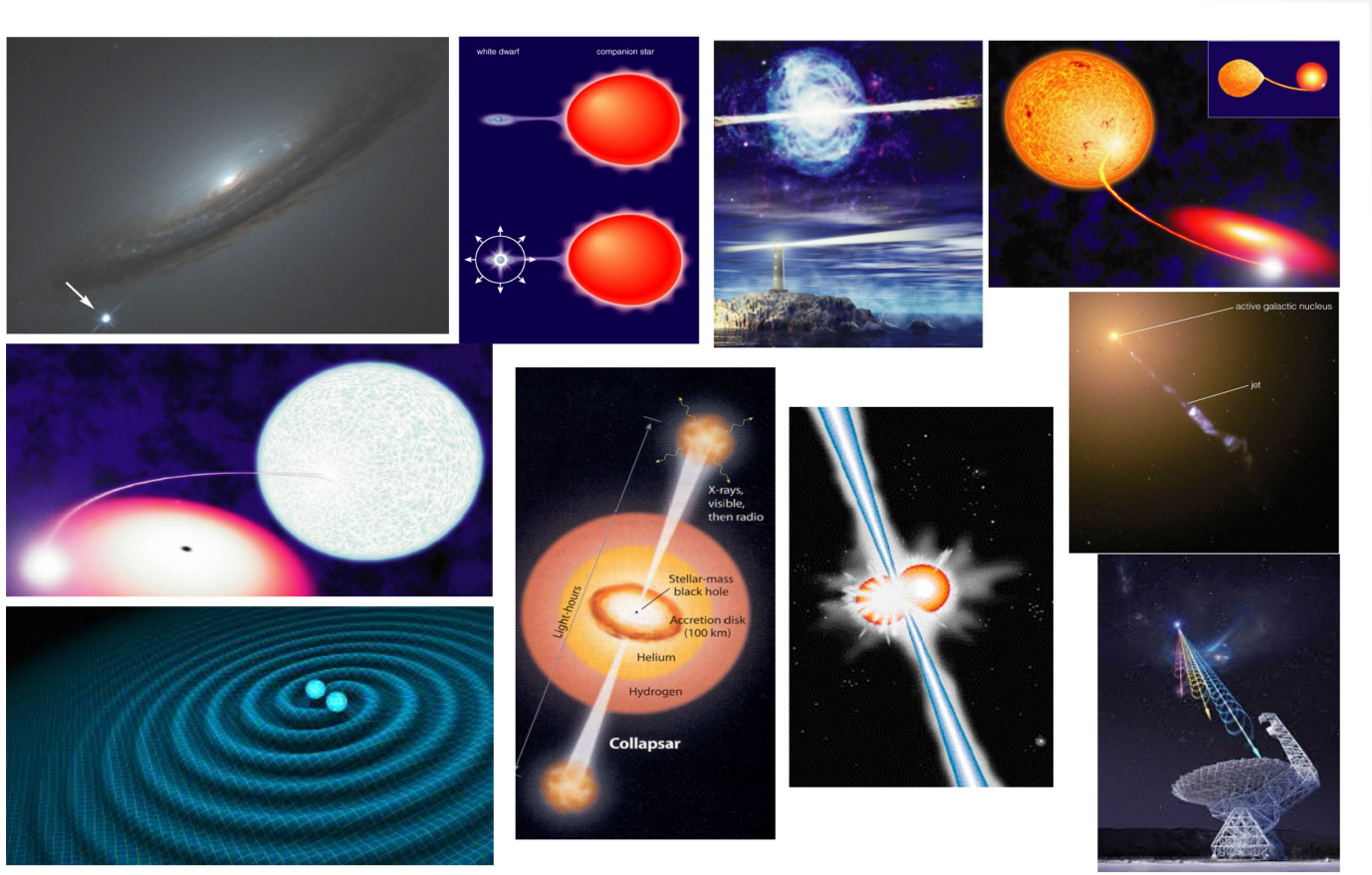
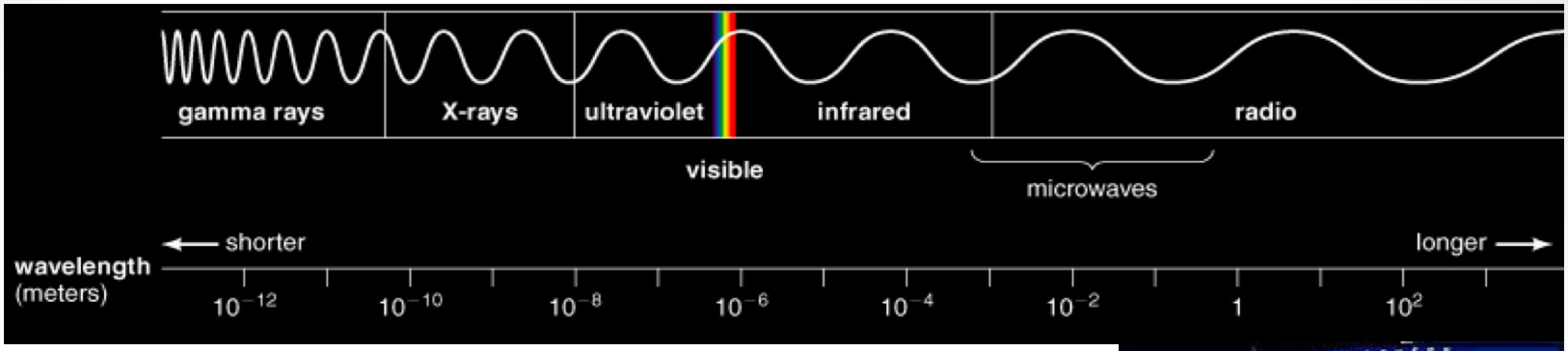
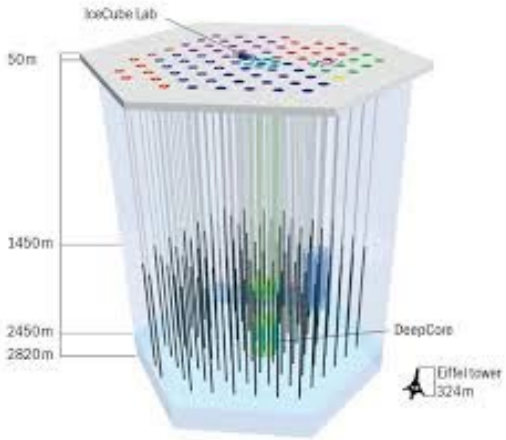


- Dr. Zhang's research covers a broad spectrum in high-energy astrophysics. He studies black holes of different scales, neutron stars of different species, and intense jets they launch. He is most actively working on the following three directions:
  - Gamma-ray bursts (the most luminous explosions in the universe)
  - Electromagnetic counterparts of gravitational waves
  - Fast radio bursts (a mysterious type of radio bursting signal)





- In terms of observational data, Dr. Zhang's theoretical work make use of multi-wavelength and multi-messenger data:
  - Multi-wavelength: across the entire electromagnetic spectrum (from MHz radio waves to TeV gamma-rays)
  - Multi-messenger: Besides the traditional electromagnetic radiation, also include gravitational waves, neutrinos, and cosmic rays.

Astrophysical Fluid Dynamics

Dr. Zhaohuan Zhu

Department of Physics and Astronomy

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Email: zhaohuan.zhu@unlv.edu

Expertise:

Fluid dynamics for astronomical project

Star and planet formation

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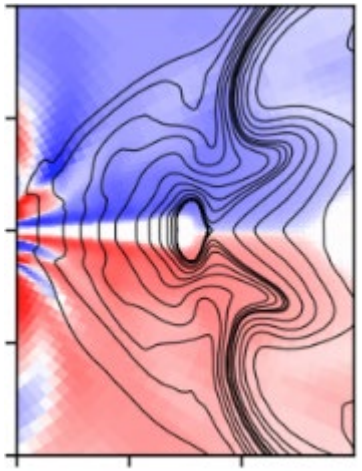
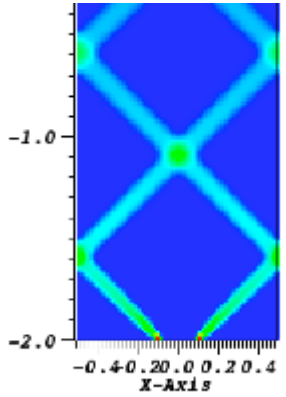
Fluid dynamics:

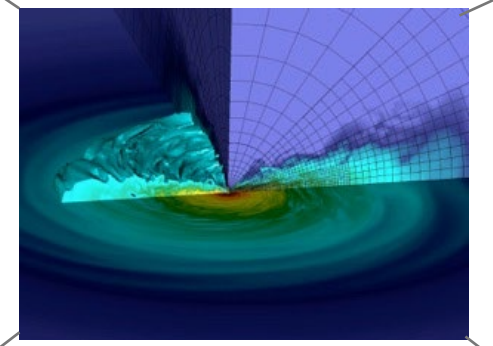
- Developing and using the state of the art numerical code to solve astrophysical fluid problem.

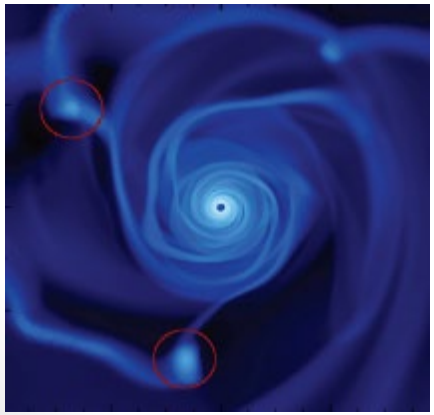


Magnetic field

Radiation

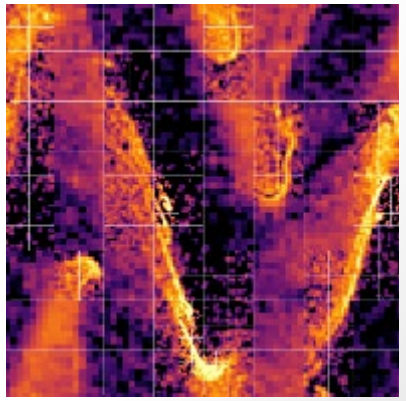






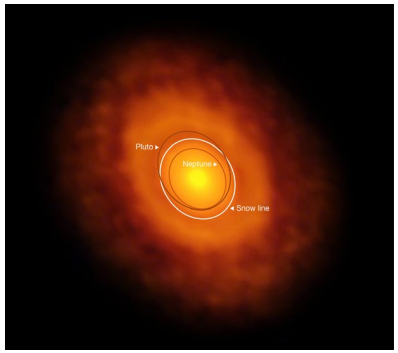
gravity

particles



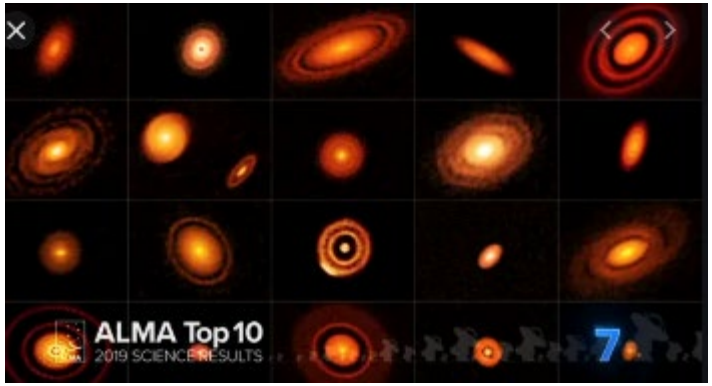
Star and planet formation:

- Protoplanetary disk dynamics:



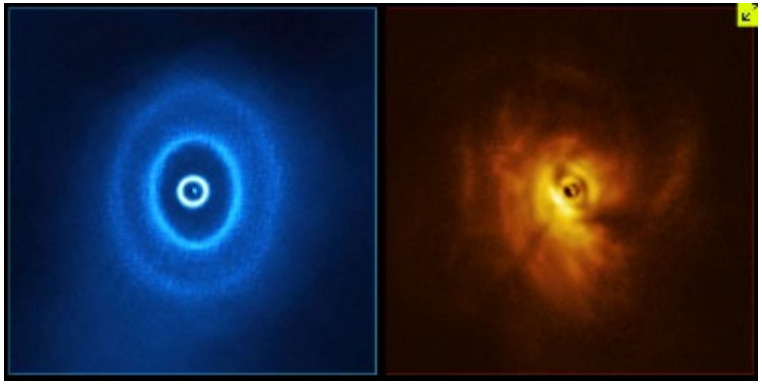
V883 Ori, *Nature*

- Planet formation



DSHARP

- Planet-disk interaction



GW Ori, *Science*