PLENARY PROGRAM:
SCIENCE AND AEROSPACE FRONTIERS

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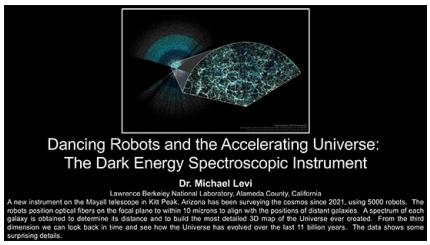
PACIFIC TIME



MICHAEL LEVI
Lawrence Berkeley
National Laboratory

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KAKANI KATIJA
Monterey Bay Aquarium
Research Institute

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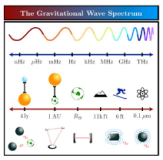
Seeing the Spectrum of the Universe in Gravitational Waves



Sebastian Ellis
Université de Genève, Genève, Switzerland

Our eyes are incredibly capable cameras, and yet they are only sensitive to a sliver of the full spectrum of electromagnetic radiation. In the last centuries, we have gone beyond the limitations of biology, and developed sensors for all wavelengths of light. We now measure light waves shorter than the size of a nucleus and larger than our planet. Almost ten years ago, we made our first detection of gravitational radiation, a phenomenal technological achievement. However, so far we are limited: we only "see" about a factor of 10 of the spectrum of gravitational waves. In this talk, I will discuss why we should expect to see gravitational waves across a wide range of wavelengths, and I will summarize ongoing efforts to go beyond our current limitations. Similarly to how we see the light spectrum of the universe, we may soon be able to see what the universe looks like in gravitational waves.

SEBASTIAN ELLIS
University of Geneva

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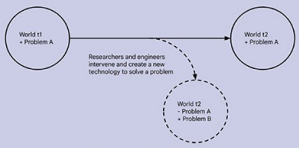
Engaging Engineers though Moral Imagination, Science Fiction, and Creative Diagrams



Ben Zevenbergen
Google, Amsterdam, The Netherlands

Technologists are eager to engage with the human, social, and ethical dimensions of their work, but often lack the tools and mindsets to do so effectively. This talk introduces the "Moral Imagination" a methodology designed to empower tech teams to explore and address ethical considerations through creative diagrams, science fiction, and playful facilitation. Discover how this innovative approach, inspired by Google's commitment to responsible innovation, can transform how we envision the technologies we build.

BEN ZEVENBERGEN
Google

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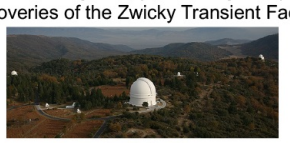
Illuminating the Dynamic Night Sky:
Discoveries of the Zwicky Transient Facility



Shri Kulkarni
California Institute of Technology, Pasadena, California

The Universe began only with hydrogen and helium. It is stars living and especially dying (supernovae) that gradually built up the periodic table. Astronomers have now identified several classes of cosmic explosions of which supernovae constitute the largest group. The Palomar Transient Factory was an innovative dual robotic telescope experiment, and its successor, the Zwicky Transient Factory (ZTF), is a high-tech project with gigantic CCD cameras, sophisticated algorithms (employing machine & deep learning) and robust pipelines, and squarely aimed to systematically find "blips and booms in the middle of the night". The speaker will talk about the great returns and surprises from this project: super-luminous supernovae, new classes of transients, new light on progenitors of supernovae, detection of gamma-ray bursts by purely optical techniques and troves of pulsating stars and binary stars. ZTF is now considered to be the steppingstone for the national flagship Rubin Observatory.

SHRI KULKARNI
California Institute of
Technology

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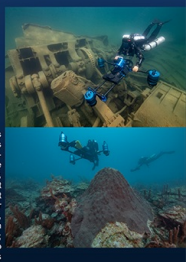
Preserving the Past – Underwater History Through a 3D Lens



Brett Seymour
Submerged Resources Center,
National Park Service, Denver, Colorado

Structure from Motion (SIM) – also known as photogrammetry - is an emerging technology that generates three-dimensional visualizations from a sequence of two-dimensional images. The application has become mainstream in fields such as engineering, augmented reality, archaeology, and urban planning. But what about underwater? This talk will explore the technology, highlight the applications, and provide examples of how underwater 3D photogrammetry can be used in science, management, and educational frameworks. From ancient Roman shipwrecks to the most famous wreck of all – RMS Titanic; from WWII planes scattered in the warm Pacific Ocean to polar exploration vessels inside the Arctic Circle, this presentation will bring history to life and provide a fascinating 3D glimpse into the underwater world.

BRETT SEYMOUR
National Park Service

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Phil Higuera
University of Montana

Wildfires are inevitable. How can we minimize human suffering?

Philip Higuera
University of Montana, Missoula, Montana

Our nation is facing a wildfire crisis, defined most poignantly by an increasing loss of life and property from fire disasters. Despite the urge to identify a single culprit, the causes are multifaceted and reflect societal decisions going back decades to centuries: colonization, internal-combustion engines and global warming, fire suppression, affordable housing, and an overarching fear of fire. Yet, fire has been part of our planet for millions of years. Much of life on Earth evolved with fire, including humans. How can understanding the deep history of fire on our planet help us live safely with fire today? How can we use "good fire" to help adapt to an increasingly flammable world? Answers are well known and ultimately require confronting the paradox that living safely with fire depends on renegotiating our relationship to see fire as friend and not foe.

Joseph Shaw
Montana State University

Fishing for Invasive Lake Trout with Airborne Lidar

Joseph Shaw
Montana State University, Bozeman, Montana

The 1994 discovery of non-native lake trout in Yellowstone Lake at the southeast corner of Yellowstone National Park launched a struggle to preserve the Yellowstone ecosystem. Lake trout eat the prized native cutthroat trout but live far too deep to fill the cutthroat trout role as primary protein source for animals that include bears, pelicans, and otters. When fisheries biologists needed information on where the lake trout spawn, Montana State University lidar researchers developed a custom airborne lidar ("laser radar") system to fly in a small airplane and hunt for laser scattering signatures to reveal lake trout spawning locations. Manual examination of lidar data successfully identified previously unknown spawning sites and machine learning methods have been developed recently to automate the analysis. This presentation tells the story of how a university-based optical scientist led the development and refinement of airborne lidar methods that are contributing to saving the Yellowstone ecosystem where his ancestors more than a century before ran one of the first camping companies in the newly established Yellowstone National Park.