Astronomy Open Night, Friday, September 4, 2015

ESS 001; 7:30 P.M.

For more information: http://www.astro.sunysb.edu/openight/opennite.html

James Lattimer

"Blowing in the Ether: Einstein's Legacy"

Einstein proposed the existence of gravitational waves in 1917, barely two years after introducing his general theory of relativity. In this, the centennial year of general relativity, we are on the cusp of directly observing this radiation, which will open a new window to our universe. Ironically, Einstein subsequently had doubts as to the reality of gravitational radiation. 20 years after proposing them, he wrote a paper claiming they were unstable and would collapse in on themselves. Later, he reversed his position. In this talk, the probable sources of gravitational waves, and the instruments that have been built to detect them, will be described. Incredibly, the expected signals are so weak that they will only be detected if theorists have predicted the correct templates. Plans to improve and expand the number of current detectors will also be discussed.

Professor Lattimer has been a faculty member at Stony Brook for 36 years, and was recently named a Distinguished Professor. He specializes in the study of neutron stars and black holes. He has been awarded the Hans A. Bethe Prize, the highest accolade for nuclear astrophysics given by the American Physical Society.

World of Physics Open Night, Friday, September 11, 2015

ESS 001; 7:30 P.M.

Sanjay Sampath

"Protecting Engineering Components with Thermal Plasma Spray Painting"

Many engineering components from automobiles to aero engines to heavy machinery experience harsh environmental exposure such as high temperature, wear and corrosion. Metallic materials that perform the structural functions require protective coatings to enable their operations in these situations. These coatings are usually made of ceramic or metallic materials and need to be deposited onto the metallic structures. Since the coating materials have very high melting points, heat sources required to melt and spray these materials are needed. Thermal plasmas formed through dissociation and ionization of inert gases provide very high temperature sources with temperatures exceeding 15000 K and as such allow melting and projecting of particles. So called

plasma spray technology is widely used in engineering industry. This presentation will discuss the technology and provide examples of day to day applications which allow aircrafts to fly more efficiently power plants to reduce their carbon dioxide emissions and even allow orthopedic implants to improve functionalities.

Professor Sampath is a Professor of Materials Science and Engineering, an affiliate Professor of Mechanical Engineering and Director of the Center for Thermal Spray Research (CTSR) at Stony Brook University. His research encompasses the fields of thermal spray processing of materials, synthesis and application of multilayered surfaces and development of direct write technology for thick film sensors and electronics. His specific current research involves an integrated strategy associate with science and technology of thermal spray processing of materials. The program has both fundamental and applied components. The fundamental science relates to the evolution of microstructures associated with far from equilibrium conditions. The applied component is the applicability of the thermal spray fundamentals to industrial processes in coating design, performance and reliability.

Prof. Sampath offers any interested parties a tour of his plasma spray lab (in the Heavy Engineering building) after his talk.

Geology Open Night, Friday, September 18, 2015

ESS 001; 7:30 P.M.

Timothy Glotch

"Science and Exploration of the Moon enabled by Stony Brook's RIS4E Team"

The Remote, In Situ, and Synchrotron Studies for Science and Exploration (RIS4E) team is one of nine nodes of NASA's new Solar System Exploration and Research Virtual Institute. Our team is addressing key aspects of the science and exploration of the Moon and other Solar System bodies Using a comprehensive approach to better understand the spectral data of samples and surfaces, how we will one day safely explore those surfaces, and in turn maximize our measurements of all samples, especially small, precious returned samples, RIS4E will produce a wealth of information and a team of well-trained next generation scientists.This talk, as a celebration of International Observe the Moon Night, will provide an overview of the five-year RIS4E effort, which is divided into four main research themes. These themes are:

1. Preparation for Exploration: Enabling Quantitative Remote Geochemical Analysis of Airless Bodies. The RIS4E team is engaging in studies of remote sensing targets of opportunity, and experimental and theoretical studies to optimize the interpretation of remote sensing data sets, including experimental space weathering studies, simulated lunar/asteroid environment spectroscopic measurements, and tests of advanced spectral unmixing techniques.
2. Maximizing Exploration Opportunities: Development of Field Methods for Human Exploration. Science-motivated field work is helping us evaluate the role of handheld and portable field instruments for future human exploration of the Moon, enabling rapid, low-risk, comprehensive, and quantitative assessments of the local geology and regolith materials.
3. Protecting our Explorers: Understanding How Planetary Surface Environments Impact Human Health. Future astronauts will be exposed to harsh environments on the Moon, with potentially harmful but unknown health effects. The RIS4E team is performing experiments to determine the reactivity and toxicity of lunar analog materials, and, eventually, actual lunar samples.
4. Maximizing Science from Returned Samples: Advanced Synchrotron and STEM Analysis of Lunar and Primitive Materials. The National Synchrotron Light Source II at Brookhaven National Laboratory will be open to conduct experiments in the fall of 2014. This next-generation light source will provide unparalleled chemical and mineralogical analysis of precious lunar and primitive materials, which the RIS4E team is taking advantage of to tightly constrain the oxygen content of the early Solar System.

Timothy Glotch is an Associate Professor in the Department of Geosciences at Stony Brook, where he has been since 2007. He completed his Ph.D. in Geosciences at Arizona State University in 2004 and was a postdoc at Caltech from 2005-2007. His research is focused on using laboratory spectroscopic techniques and sophisticated light scattering models to enable more quantitative interpretation of spectroscopic data sets. This work includes using laboratory visible/near-infrared reflectance, thermal infrared emission, and Raman spectroscopies, both on remote sensing platforms and in the laboratory, to determine the composition of geologic materials on the surfaces of the Moon, asteroids, Mars, and its moons. He has received NASA group achievement awards for his work with the Odyssey THEMIS and MER Mini-TES instruments that have flown to Mars and the Lunar Reconnaissance Orbiter Diviner Lunar Radiometer Experiment. He is a Co-Investigator on Diviner, which has been orbiting the Moon since 2009. In 2012, he was awarded the National Science Foundation Early Career Award. He is the Principal Investigator of the $5.5M Remote, In Situ, and Synchrotron Studies for Science and Exploration (RIS4E) team, which is part of NASA's Solar System Exploration Research Virtual Institute (SSERVI).

Living World Open Night, Friday, September 25, 2015

ESS 001; 7:30 P.M.

For more information: http://life.bio.sunysb.edu/marinebio/livingworld/

Demian Chapman

"Fin-ale: averting extinction of the world's sharks and rays"

Sharks and rays have been part of marine ecosystems since well before the rise of the dinosaurs and many species may soon join the ancient reptiles in extinction. Rough estimates place to total annual catch of sharks at 100,000,000 per year, where many are discarded but the rest are used for human consumption. The primary products derived from sharks and rays are meat and, for some species, fins. Certain sharks and rays have fins that when processed yield noodle-like material that form the basis of the Asian delicacy shark fin soup. Fetching upwards of $100 for a bowl the demand for fins in the last several decades has fueled an expansion and intensification of shark and ray fishing on a global scale. Sharks and ray populations replenish themselves very slowly and have simply been unable to keep up with the rate at which individuals are being removed from the ocean. In this talk I will outline what we know about the shark fin trade based on the latest analysis of trade and genetic analysis of the markets. I will review what fishing to supply this trade has done to shark and ray populations in several parts of the world and highlight the repercussions for the ocean and for us. Finally, I will share details of new conservation efforts that are emerging all over the globe that may turn the tide for sharks and rays if we continue to invest in them.

Dr. Demian Chapman (Ph.D.) is an Associate Professor at Stony Brook University's School of Marine and Atmospheric Science. His research combines modern genetic analysis with field ecology to better understand the biology, trade and conservation needs of the world's sharks and rays. He is especially interested in how sharks and rays are connected to specific geographic locations and what this means for the structure and genetic composition of their populations. This avenue of research is useful for designing protected areas, assessing populations and tracing fins in trade to source region of origin, all of which are key strategies for saving these animals.

Directions to SUNY Stony Brook and ESS Building

⇨ From exit 62 of the Long Island Expressway (LIE, I-495) follow Nicolls Road (Route 97) north for nine miles. Pass the South and Main entrances to the University.

⇨ Enter the North entrance which will be on your left.

⇨ At the top of the small hill, turn right on Circle Road.

⇨ Proceed about 1 mile.

⇨ Turn left onto Campus Drive and then immediately turn left again onto John S. Toll Drive.

⇨ Proceed about 50 yards then turn right into the large paved parking lot.

⇨ The Earth and Space Sciences building is the large concrete building at the northeast end of the parking lot.

Map of campus is on the web at: http://www.stonybrook.edu/sb/map/

TEACHER IN SERVICE CREDITS

If your school requires you to have a sequence of educational opportunities in order to receive in-service credit, please advise them that during the Fall 2014 semester we will provide attendance certification for each of the lectures attended.

Please contact the respective department for more information.