The Department of Physics and Astronomy presents 2019 William H. Nelson Lecture:

NEW HORIZONS AND GRAND CHALLENGES FOR NANOPHOTONICS

Prof. Harry Atwater, California Institute of Technology,

Tuesday, 8 October 2019, 3:00pm

Speaker's Auditorium, GSU Student Center

Abstract: Research in nanophotonics, the science of light-matter interactions below the optical wavelength scale, is yielding advances that are opening paths for conceptually new "grand challenge" photonic technologies that have not previously been achievable. I will discuss three examples. The first is realization of comprehensively tunable nanoantenna arrays, which enable dynamic, active control of the constitutive properties of light, opening new applications such as phased-array optical beam steering, visible light modulation for communication and thermal radiation management. A second grand challenge is bringing next-generation solar energy technology to fruition. Nanophotonic design has enabled new directions for beyond-Si photovoltaics, such as luminescent solar concentrators that can enable an efficient and stable approach to tandem-on-Si photovoltaics. Nanostructure design is also critical to generation of chemical fuels from sunlight, and recent advances in nanostructures have allowed photoelectrochemical water splitting with record efficiency. A final grand challenge for nanophotonics is design of spacecraft capable of reaching the stars beyond our solar system, since light itself is the only fuel capable of propelling spacecraft to the relativistic speeds needed to achieve interstellar travel. The Breakthough Starshot initiative has captured scientific imagination and motivated thinking about prototypes for light-driven spacecraft that could reach nearby stars.

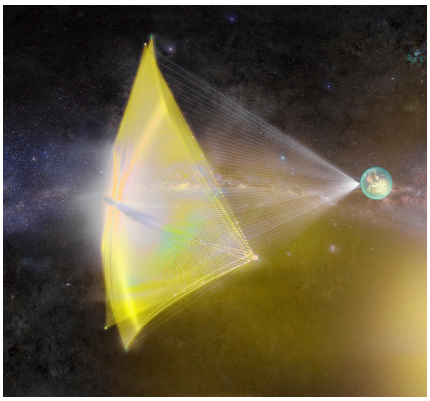
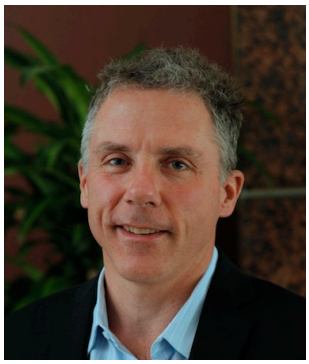


Image: Breakthrough Initiatives



Harry Atwater is the Howard Hughes Professor of Applied Physics and Materials Science at Caltech. His scientific interests include light-matter interactions in materials and solar energy conversion. He was an early pioneer in nanophotonics and plasmonics; he gave the name to the field of plasmonics in 2001. He has created new high efficiency solar cell designs and has pioneered principles for light management in solar cells. He currently serves as Director of the Joint Center for Artificial Photosynthesis, a DOE Hub.

Prof. Atwater is a Member of the US National Academy of Engineering and is a Fellow of the APS, MRS, SPIE and the National Academy of Inventors. He is the founding Editor in Chief for the journal ACS Photonics, and is Associate Editor for the IEEE Journal of Photovoltaics. He is also the founding Director of the Resnick Sustainability Institute at Caltech, Strategic Director for the QESST photovoltaics NSF Engineering Research Center, and serves as Chair of the LightSail Committee for the Breakthrough Starshot program. Atwater is the co-founder of Alta Devices, a solar photovoltaics company in Santa Clara, CA, that holds the current world records for 1 Sun single solar cell efficiency and module efficiency.

The William H. Nelson Physics & Astronomy Research Endowment was set up to honor the memory of Dr. William H. Nelson by the Nelson family. Dr. Nelson worked at GSU from 1974 until his sudden death in 2010.

Dr. Nelson began as an assistant professor in 1971, became tenured in 1981, a full professor in 1988, and served as the acting chair of Physics & Astronomy from 1992-1994. He became full chair in 1994. In 2004, Dr. Nelson became Associate Dean of Research for the College of Arts & Sciences. In 2009, he served as interim chair of the Math Department.