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Faculty

MARIN SOLJAČIĆ

Professor of Physics



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Related Links:

[Marin Soljačić's Home Page](#)

[Soljačić's Photonics and Modern Electro-Magnetics Group Page](#)

[MIT Research Laboratory of Electronics](#)

Area of Physics:

[Condensed Matter Theory](#)

Research Interests

Technological advances of the past decade have enabled the control of the material structure at length-scales smaller than the wavelength of light. This enabled the creation of new materials, *e.g.*, photonic bandgap crystals, or various surface plasmon systems, whose optical properties are dramatically different than those of any naturally occurring material. For example, nanostructured materials which display diffraction-less propagation of light, exhibit negative refraction, or support very slow propagation of light, have all been demonstrated. Professor Soljagic's interests are in exploring the new and exciting physical phenomena supported by these materials.

The unique properties of these new materials have already enabled a wide range of very important applications, *e.g.*, in medicine, telecommunications, defense, etc., and are expected to do so even more in the future. Professor Soljačić is also interested in various topics in nonlinear optical physics. Maxwell's equations as presented in most undergraduate text books are linear. However, all materials in nature are nonlinear (including vacuum), and sure enough, at high light intensities, optical phenomena become nonlinear, displaying a wide range of rich and beautiful behavior. For example, almost every general non-linear dynamics phenomenon, *e.g.*, solitons, pattern formation, fractals, etc., can now be studied in optical material systems. Professor Soljagic is also interested in investigating the feasibility of wireless power transfer, which he and colleagues have dubbed "[WiTricity](#)."

Biographical Sketch

Marin Soljačić received a BsE degree in physics and a BsE degree in electrical engineering from MIT in 1996. He earned his PhD in physics at Princeton University in 2000. In September 2000, he was named an MIT Pappalardo Fellow in Physics, and in 2003 was appointed a Principal Research Scientist in the Research Laboratory of Electronics at MIT. In September 2005, Soljačić became an Assistant Professor of Physics at MIT; in July 2010 an Associate Professor; and in July 2011 a Full Professor. Soljačić is also one of the founders of WiTricity Corporation (2007).

Soljačić's main research interests are in electromagnetic phenomena, focusing on nanophotonics, non-linear optics, and wireless power transfer. He is the recipient of the Adolph Lomb medal from the Optical Society of America (2005), and the TR35 award of Technology Review magazine (2006). In 2008, he was named a MacArthur Fellow. Soljačić has been a correspondent member of the Croatian Academy of Engineering since 2009. In 2011, he became a Young Global Leader (YGL) of the World Economic Forum.

Selected Publications

- "Observation of trapped light within the radiation continuum," Chia Wei Hsu, Bo Zhen, Jeongwon Lee, Song-Liang Chua, Steven G. Johnson, J.D.Joannopoulos, and Marin Soljačić. *Nature* **499**, 188, (2013).
- "Observation of unidirectional backscattering-immune topological electromagnetic states," Zheng Wang, Yidong Chong, J.D.Joannopoulos, and Marin Soljačić. *Nature* **461**, 772, (2009).
- "Wireless Power Transfer via Strongly Coupled Magnetic Resonances," Andre Kurs, Aristeidis Karalis, Robert Moffatt, J.D.Joannopoulos, Peter Fisher, and Marin Soljačić. *Science* **317**, 83, (2007).
- "Enhancement of non-linear effects using photonic crystals," Marin Soljačić, and J.D. Joannopoulos. Invited review article in *Nature Materials*, **3**, 211, (2004).

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