



# PHYSICS and ASTRONOMY

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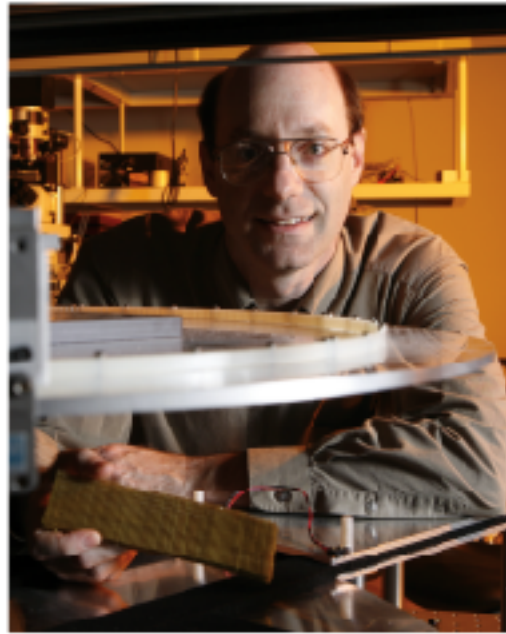
## the 9<sup>th</sup> Walter Selove Lectureship in Experimental Physics

University of Pennsylvania Department

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### David R. Smith

Associate Professor and Augustine Scholar  
Electrical and Computer Engineering  
Duke University  
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Since 2004, Dr. David R. Smith has held the position of Associate Professor and Augustine Scholar in the Electrical and Computer Engineering Department at Duke University. Dr. Smith is also an Adjunct Associate Professor in the Physics Department at the University of California, San Diego (UCSD), and is a Visiting Professor in the Physics Department at Imperial College, London. Dr. Smith's research has been focused on advanced electromagnetic materials and composites, including photonic crystals and metamaterials. In 2000, Dr. Smith and colleagues at UCSD demonstrated the first metamaterial with a negative index-of-refraction. Dr. Smith was selected as a member of The Electromagnetics Academy in 2001; was a co-recipient of the Descartes Research Prize awarded by the European Union in 2004; received the Stansell Research Award from the Pratt School of Engineering in 2005; and was selected to be one of Scientific American's "Top 50" researchers and policy makers in 2006. His work has twice been selected as one of the top ten scientific breakthroughs of the year by Science Magazine (2003, 2006).

#### Invisibility: The Metamaterial Approach

Wednesday, February 14<sup>th</sup>, 2007

4:00PM

David Rittenhouse Laboratory, RmA1  
209 South 33rd Street

Recently, we presented a theoretical approach to the construction of an "invisibility cloak" - a hypothetical structure that could shield an object from detection by causing electromagnetic waves to avoid being scattered by the object. The cloak and other structures designed by this approach are electromagnetically complex, requiring anisotropic media with independently varying spatial gradients in nearly all of the permittivity and permeability tensor elements. Such a complicated medium might easily have been dismissed as impractical were it not for the recent developments in the field of metamaterials. Metamaterials are artificially structured materials in which dielectric and metallic inclusions replace the atoms and molecules of conventional materials. By careful design, a much larger range of constitutive parameters can be realized using metamaterials, to the point that even devices that seem to belong more in the realm of science-fiction than science-reality can now be considered.

#### Advances in Effective Medium Theory: From Negative Index Metamaterials to Invisibility

Thursday, February 15<sup>th</sup>, 2007

4:00PM

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