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Metamaterials Open New Horizons in Electromagnetism

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Abstract:
In the last decade, a new area of research has emerged and the stimulus has been our ability to produce materials with entirely novel electromagnetic properties. Known as metamaterials for their ability to take us beyond conventional materials they give access to such remarkable effects as negative refraction. Spurred by the new opportunities theorists have produced exotic concepts which exploit the new materials: we can now specify how to make a lens whose resolution is limited not by the laws of nature but only by our ability to build to the stated specifications; we can guide radiation along an arbitrary trajectory so as to avoid objects, causing them to appear invisible; materials that are active magnetically in the optical range have been designed and manufactured. There has been a truly amazing amount of innovation but more is yet to come. The field of metamaterials is developing into a highly disruptive technology for a plethora of applications where control over light (or more generally electromagnetic radiation) is a prominent ingredient amongst them telecommunications, solar energy harvesting, stealth, biological imaging and sensing, and medical diagnostics.

Speaker's Bio:
Dr. Pendry is a condensed matter theorist. He has worked at the Blackett Laboratory, Imperial College London, since 1981. He began his career in the Cavendish Laboratory, Cambridge, followed by six years at the Daresbury Laboratory where he headed the theoretical group. He has worked extensively on electronic and structural properties of surfaces developing the theory of low energy diffraction and of electronic surface states. In 1992 he turned his attention to photonic materials and in 2000 published a seminal paper (cited ~5000 times) on the"perfect lens," which has revolutionized nanoscale optics.

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