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变换物理学——原理与应用

Transformation physics: from fundamentals to applications

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报告人简介：

Martin Wegener博士现任德国卡尔斯鲁厄理工学院（Karlsruhe Institute of Technology）应用物理系终身教授（AG Professor），德国科学院院士，美国光学学会会士（Fellow），赫克托基金会（Hector Foundation）会士，美国亚利桑那光学中心兼职教授。Wegener教授1987年博士毕业于法兰克福大学（Johann Wolfgang Goethe University）。1987-1989年在美国贝尔实验室（AT&T Bell Laboratories）进行博士后研究。1990-1995年进入德国多特蒙德大学并担任教授。1995-2001年加入德国卡尔斯鲁厄大学。2001年至今就职于卡尔斯鲁厄理工学院并担任纳米结构中心负责人（Coordinator of the DFG-Center for Functional Nanostructures）。

Martin Wegener博士的研究方向包括：光子晶体、光学超材料、超快光学、非线性光学、近场光学等多个领域。他在许多光学前沿方向做出了开创性的研究工作，在学术界享有很高知名度。1999年以来，Wegener博士在《Science》上发表7篇论文，在《Nature》系列杂志发表6篇论文，在《Physical Review Letters》上发表11篇论文，在《Advanced Materials》上发表13篇，出版专著5本。

Biography:

After completing his PhD in physics in 1987 at Johann Wolfgang Goethe-Universität Frankfurt (Germany), he spent two years as a postdoc at AT&T Bell Laboratories in Holmdel (U.S.A.). From 1990-1995 he was C3-Professor at Universität Dortmund (Germany), since 1995 he is C4-Professor at Universität Karlsruhe (TH). Since 2001 he has a joint appointment at Institut für Nanotechnologie of Forschungszentrum Karlsruhe GmbH. Since 2001 he is also the coordinator of the DFG-Center for Functional Nanostructures (CFN) in Karlsruhe. His research interests comprise ultrafast optics, (extreme) nonlinear optics, near-field optics, photonic crystals, photonic metamaterials, and transformation optics. This research has led to various awards and honors, among which are the Alfried Krupp von Bohlen und Halbach Research Award 1993, the Baden-Württemberg Teaching Award 1998, the DFG Gottfried Wilhelm Leibniz Award 2000, the European Union René Descartes Prize 2005, the Baden-Württemberg Research Award 2005, and the Carl Zeiss Research Award 2006. He is a member of Leopoldina, the German Academy of Sciences (since 2006), Fellow of the Optical Society of America (since 2008), Fellow of the Hector Foundation (since 2008), and Adjunct Professor at the Optical Sciences Center, Tucson, U.S.A. (since 2009).

报告摘要：

变换光学（Transformation optics）可以使几何空间上的变化转移到非均匀光学超材料的光学参量的变化上。光学隐身就是其中典型的例子，就在几年前人们还认为这是不可能的。为了制备光频段、宽带、偏振不敏感、三维的光强、相位隐身材料，我们利用激光直写结合受激辐射耗尽技术，它可以突破传统的衍射极限。这种变换的思想同样可以应用到其他领域，如：力学（确切的说，弹性动力学）和热力学。报告中还将讨论相关的实验过程和研究结果。

Abstract:

Transformation optics allows for mapping the geometry of space onto spatially inhomogeneous optical properties of metamaterials. Invisibility cloaks are a demanding benchmark example because they were believed impossible just a few years ago. For the fabrication of visible-frequency, broadband, polarization-independent, three-dimensional invisibility cloaks for the amplitude and phase of light, we use direct-laser-writing (DLW) optical lithography combined with stimulated-emission depletion (STED), which breaks Abbe's diffraction limit. The transformation idea can also be translated to other areas such as mechanics (precisely, elastodynamics) and thermodynamics. Corresponding experiments will be discussed, too.

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