

# 凝聚态物理-北京大学论坛

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## 等离子元激光器\_纳米相干光源科学与技术

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时间：3月28日（星期四）15:00—16:40

地点：北京大学物理楼中212教室

**报告摘要：**激光器是高频电磁辐射的相干信号源，在各学科和技术中有着广泛的应用。在报告中，我将介绍一类新的纳米尺度的激光器：等离激元激光器。表面等离激元是外界光场与金属中自由电子相互作用的电磁模，可以超越衍射极限，将光场限制在纳米尺度。它在超分辨率纳米光刻、高密度数据存储、近场光学等领域有着广泛的应用。通过激发和放大表面等离激元，我们可以得到一类新的超越衍射极限的激光器。我将首先介绍首个室温等离激元激光器，以及在微腔中光与物质的相互作用增强效应。我也将讨论一种波导嵌入型等离基元激光器。波导嵌入型等离基元激光器可以实现纳米级激光器的定向发射，同时可以极大的增强辐射效率。最后，我将介绍一些等离激元激光器的潜在应用。

Lasers are the coherent sources of high frequency electromagnetic radiation with applications spanning all physical sciences and technology. In this talk I will introduce a new class of laser, named plasmon laser that surpassed the diffraction limit of light. By exciting surface plasmons, collective electronic oscillations at metal-dielectric interfaces, the close proximity of the semiconductor and metal interfaces concentrates light into a space well below the diffraction limit. I will present the results of first solid state plasmon laser operated at room temperature where the light-matter-interaction has been strongly enhanced. I will also discuss how to manipulate the radiation properties of a plasmon laser to overcome two fundamental constrains, the lacks of directionality and low radiation efficiency of plasmon laser. I will conclude by introducing some applications of plasmon laser.

**马仁敏**，马仁敏2009年在北京大学获得物理学博士学位。他的博士论文工作主要集中在纳米光电子器件和物理领域，并获得全国百篇优秀博士学位论文。目前是在加州大学伯克利分校做博士后，从事等离激元激光器，以及纳米光子学和量子光学等方面的研究工作。

Dr. Ren-Min Ma received the Ph. D. degree in Physics from Peking University in 2009. His dissertation was focused on nanoscale optoelectronic devices and physics and received the National Top 100 Ph.D. dissertations of China Award. He is currently a leading postdoctoral scholar at UC Berkeley where he works on the development of plasmon laser, as well as nanophotonics and quantum optics.

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Photograph by Xiaodong Hu