

课程教学大纲

| 课程基本信息 (Course Information) | | | | | |
|--|---|---------------------------|----|-------------------------------------|-----|
| 课程代码 (Course Code) | 001-(2017-2018-1)PH358 | 学时 (Credit Hours) | 32 | 学分 (Credits) | 2.0 |
| 课程名称 (Course Name) | (中文) 激光等离子体物理 | | | | |
| | (英文) Laser Plasma Physics | | | | |
| 课程性质 (Course Type) | 专业选修课程 | | | | |
| 授课语言 (Language of Instruction) | Chinese | | | | |
| 开课院系 (School) | School of Physics and Astronomy | | | | |
| 先修课程 (Prerequisite) | Classical Electrodynamics | | | | |
| 授课教师 (Teacher) | Liejia Qian, Min Chen | 电邮、电话 (email& phone) | | minchen@sjtu.edu.cn | |
| 办公时间 (Office Time) | Friday Afternoon 2:00-5:30 | 办公地点 (Office Location) | | Laboratory for Laser Plasma Physics | |
| 课程网址 (Course Webpage) | (None for now) | | | | |
| *课程简介 (Description) | 通过课程学习, 使得学生能够掌握激光, 等离子体及激光等离子体相互作用物理的基础知识, 了解本领域的发展历史和最新发展概况, 为学生进行本专业的研究生阶段学习和科学研究奠定基础; 同时以此为契机, 掌握科学研究的一般方法和基本技能。 | | | | |
| *课程简介 (Description) | Through the course study, students will learn fundamental knowledge of laser, plasma, and laser plasma interaction physics, the history and the most recent progress of this field. The course is arranged for the undergraduate students who would like to select laser plasma as his next step of studies. It will also give the students some basic training on research methods and skills, which could be used in other scientific researches. | | | | |
| 课程教学大纲 (course syllabus) (以下内容根据所选语言, 如为外文授课, 需必填中文、英文相对应的两部分内容, 小语种课程可选填对应语言) | | | | | |

| <p>*学习目标 (Learning Outcomes)</p> | <p>1. 熟悉激光及超短超强激光的基本原理，及最新进展； 2. 了解等离子体物理的概貌，及激光等离子体物理的发展历史，及其应用； 3. 掌握单电子在激光场中的运动形式，激光在等离子体中的传输，尾波激发及加速，激光等离子体中辐射的基本原理； 4. 了解激光等离子体物理研究的基本驱动及探测手段。</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|------|-------|------|-------|------|------|--------------|---|------|------|--|--|------|---|------|------|--|--|-----------|---|------|------|--|--|---------|---|------|------|--|--|---------|---|------|------|--|--|---------|---|------|------|--|--|----------|---|------|------|--|--|--------------|---|------|------|--|-----|------------|---|------|--|--|--|--------------|---|------|------|--|--|-------------|---|------|------|--|--|---------|---|------|------|--|--|--------------|---|------|------|--|--|----------|---|------|------|--|--|--------|---|------|------|--|--|------------------|---|------|-----|--|-----|--|--|--|--|--|
| <p>*教学内容、进度安排及要求 (Class Schedule & Requirements)</p> | <table border="1"> <thead> <tr> <th>教学内容</th> <th>学时</th> <th>教学方式</th> <th>作业及要求</th> <th>基本要求</th> <th>考查方式</th> </tr> </thead> <tbody> <tr> <td>激光等离子体物理概要介绍</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>激光原理</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>飞秒激光及科学介绍</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>飞秒脉冲的产生</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>飞秒脉冲的测量</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>飞秒脉冲的放大</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>飞秒激光的对比度</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>超短超强激光的现状与展望</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td>大作业</td> </tr> <tr> <td>实验室参观或进展讲座</td> <td>2</td> <td>现场介绍</td> <td></td> <td></td> <td></td> </tr> <tr> <td>等离子体物理及单电子运动</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>激光在等离子体中的传输</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>激光尾场的激发</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>尾场加速基本原理与定标率</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>尾场中的电子注入</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>尾场中的辐射</td> <td>2</td> <td>课堂讲授</td> <td>课后练习</td> <td></td> <td></td> </tr> <tr> <td>激光尾场加速的实验及理论最新发展</td> <td>2</td> <td>课堂讲授</td> <td>大作业</td> <td></td> <td>大作业</td> </tr> </tbody> </table> | 教学内容 | 学时 | 教学方式 | 作业及要求 | 基本要求 | 考查方式 | 激光等离子体物理概要介绍 | 2 | 课堂讲授 | 课后练习 | | | 激光原理 | 2 | 课堂讲授 | 课后练习 | | | 飞秒激光及科学介绍 | 2 | 课堂讲授 | 课后练习 | | | 飞秒脉冲的产生 | 2 | 课堂讲授 | 课后练习 | | | 飞秒脉冲的测量 | 2 | 课堂讲授 | 课后练习 | | | 飞秒脉冲的放大 | 2 | 课堂讲授 | 课后练习 | | | 飞秒激光的对比度 | 2 | 课堂讲授 | 课后练习 | | | 超短超强激光的现状与展望 | 2 | 课堂讲授 | 课后练习 | | 大作业 | 实验室参观或进展讲座 | 2 | 现场介绍 | | | | 等离子体物理及单电子运动 | 2 | 课堂讲授 | 课后练习 | | | 激光在等离子体中的传输 | 2 | 课堂讲授 | 课后练习 | | | 激光尾场的激发 | 2 | 课堂讲授 | 课后练习 | | | 尾场加速基本原理与定标率 | 2 | 课堂讲授 | 课后练习 | | | 尾场中的电子注入 | 2 | 课堂讲授 | 课后练习 | | | 尾场中的辐射 | 2 | 课堂讲授 | 课后练习 | | | 激光尾场加速的实验及理论最新发展 | 2 | 课堂讲授 | 大作业 | | 大作业 | | | | | |
| 教学内容 | 学时 | 教学方式 | 作业及要求 | 基本要求 | 考查方式 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 激光等离子体物理概要介绍 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 激光原理 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 飞秒激光及科学介绍 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 飞秒脉冲的产生 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 飞秒脉冲的测量 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 飞秒脉冲的放大 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 飞秒激光的对比度 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 超短超强激光的现状与展望 | 2 | 课堂讲授 | 课后练习 | | 大作业 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 实验室参观或进展讲座 | 2 | 现场介绍 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 等离子体物理及单电子运动 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 激光在等离子体中的传输 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 激光尾场的激发 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 尾场加速基本原理与定标率 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 尾场中的电子注入 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 尾场中的辐射 | 2 | 课堂讲授 | 课后练习 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 激光尾场加速的实验及理论最新发展 | 2 | 课堂讲授 | 大作业 | | 大作业 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>*考核方式 (Grading)</p> | <p>50%为平时成绩（含课堂课后表现 40%，出勤 10%） 50%为大作业的成绩</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>*教材或参考资料 (Textbooks & Other Materials)</p> | <p>以自编讲义为主，参考以下书目：钱列加《超短超强激光技术》自编讲义 P. Gibbon, Short Pulse Laser Interactions with Matter, 2005 E. Esarey, 激光尾波加速, Review of Modern Physics, 81, 001229 (2009) 《强场激光物理研究前沿》，盛政明，上海交大出版社</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>其它 (More)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>备注 (Notes)</p> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

备注说明：

- 1.多于 1 位教师授课的课程,如公共课程、基础课程等经教学团队商议后由负责人填写。
- 2.带*为必填项目,其他栏目根据课程情况选填。
- 3.课程简介字数为 300-500 字;课程大纲以表述清楚教学安排为宜,字数不限。