

USTC SNST 2015 Spring Semester Lecture Series

Title: Introduction to Plasma-Facing Component (PFC) and Plasma-Material Interaction (PMI) R&D for Tokamak Fusion Energy

Lecture 1: Room 1617, 930-1130, Saturday March 21, 2015

L1A: What are the Special Features of this Lecture Series? What topics to select?

L1B: Overview: from plasma core, to edge, to interface, to material surface, to component, then to outside

Lecturer: 彭元凯
Class assistant: 徐国梁
Webpage assistant: 王伸吉

My Teaching Philosophy

1. The future of fusion energy can be in your hands.
2. But, you have to decide *IF* it is or not.
3. A teacher learns through teaching, by learning to describe an idea quickly and clearly.
4. A teacher gains more back by sharing ideas.
5. A teacher is inspired when students are inspired.
6. A teacher benefits more from the students' questions than they benefit from him.
7. So, questions teach the teacher, therefore **ASK!**

Ancient Chinese wisdom inspires our R&D

1. 道德经含有道经与德经, 是中国智慧第一书。

2. “道”是“万物之源”, “道法自然”。

“source of everything”, “the law of the universe and everything in it”

3. “德”是“道发生作用的方式和结果” (ref: 任思源)。

“application (scheme) and results (effects) of the law of everything”

4. Fusion nuclear science and technology R & D aims to understand “道” and implement “德” of fusion energy.

5. So, what does 道德经四十二章: “道生一, 一生二, 二生三, 三生万物。万物负阴而抱阳, 冲气以为和。...” mean to your work in fusion energy R&D?

6. 鼓励同学发挥创造力和想像力, 探索相关的想法, 提出来讨论。The only “homework/group project” of class.

Let's have some fun!

1. These will be English-only lectures ... almost.
2. Each lecture contains two sessions of 50 minutes, 10 minutes apart.
3. Each session has only 25-minute material in PowerPoint.
4. You can ask topic-related questions any time during the lecture, in English only.
5. You can ask broader questions during the remainder of a session, time permitting.
6. I will ask for your feedback and suggestions on any aspect of the lecture during the last 10 minutes, again only in English.
7. I will stay after class to entertain additional questions.

Feedback from previous class

1. To be applied when opportunities arise:
 - Increase depth in select “hot” topic;
 - Add “how to” topics;
 - Add noteworthy episodes, experiences of fusion researchers;
 - More discussion time;
 - Add group projects (to report to class).
2. Class assistant: 徐国梁. Website assistant: 王申吉. 谢谢。
3. <http://www.snst.ustc.edu.cn/wdxz/xxzl/> for up to date info.
4. Lectures will be updated afterwards before the succeeding lecture according to the questions and feedback received.

But first, let's discuss options to topics.

Option 1: six lectures focusing on PFC/PMI (very technical)

Mo.Date	Topic
03.21	L1B: Overview: from plasma core, to edge, to interface, to material surface, to component, then to outside 概述：从等离子体的核心，到边缘，到界面，到材料表面，到组件，才到外面
03.28	L2: Edge plasma: supplied by core transport, and modified by interactions with material 边缘等离子体：由核心传输供应，也被材料的相互作用修改
04.18	L3: Plasma-facing material: bombarded by edge plasma and particles, and supported by plasma facing component 面对等离子体的材料：由边缘等离子体和微粒轰击，也有面对等离子体组件支持
04.25	L4: Plasma facing component: maintaining surface material condition 面对等离子体组件：保持表面材料状态
05.16	L5: PMI and PFC integration: weakly and strongly interacting phenomena PMI和PFC一体化：弱和强相互作用现象
05.23	L6: Accelerating progress using simplified plasma-material systems 用简化的等离子体-材料系统加快进度

Option 2: six lectures, mostly PFC/PMI, plus popular topics

Mo.Date	Topic
03.21	L1B: Overview: from plasma core, to edge, to interface, to material surface, to component, then to outside 概述：从等离子体的核心，到边缘，到界面，到材料表面，到组件，才到外面
03.28	L2A: Why most PPT presentations sucks, and how you can make them better? 为什么大多数PPT演讲很烂，你如何使他们更好？ L2B: How to write papers for scientific and technical journal publication? 如何写用于科学和技术期刊出版的论文？
04.18	L3: Edge plasma: supplied by core transport, and modified by interactions with material 边缘等离子体：由核心传输供应，也被材料的相互作用修改
04.25	L4: Plasma-facing material: bombarded by edge plasma and particles, and supported by plasma facing component 面对等离子体的材料：由边缘等离子体和微粒轰击，也有面对等离子体组件支持
05.16	L5: Plasma facing component: maintaining surface material parameters 面对等离子体组件：保持表面材料参数
05.23	L6: PMI and PFC integration: weakly and strongly interacting phenomena PMI和PFC一体化：弱和强相互作用现象

Option 3: six lectures, further reduced PFC/PMI – what to add?

Mo.Date	Topic
03.21	L1B: Overview: from plasma core, to edge, to interface, to material surface, to component, then to outside 概述：从等离子体的核心，到边缘，到界面，到材料表面，到组件，才到外面
03.28	L2A: Why most PPT presentations sucks, and how you can make them better? 为什么大多数PPT演讲很烂，你如何使他们更好？ L2B: How to write papers for scientific and technical journal publication? 如何写用于科学和技术期刊出版的论文？
04.18	L3: (To decide according to poll to be issued on 03.23, and determined on 03.30)
04.25	L4: (To decide according to poll to be issued on 03.23, and determined on 03.30)
05.16	L5: Plasma-facing material: bombarded by edge plasma and particles, and supported by plasma facing component 面对等离子体的材料：由边缘等离子和微粒轰击，也有面对等离子体组件支持
05.23	L6: PMI and PFC integration: weakly and strongly interacting phenomena PMI和PFC一体化：弱和强相互作用现象

Some useful references – Option 3

Lecture	References
L1B	<ul style="list-style-type: none">• Loarte, et al, <i>Nucl. Fusion</i> 47 (2007) S203• Pitts, et al, <i>J. Nucl. Mat.</i> 438 (2013) S48
L2	<ul style="list-style-type: none">• Rick Altman, www.betterpresenting.com• 彭元凯, "How I write a journal paper?"
L3	<ul style="list-style-type: none">• To be determined
L4	<ul style="list-style-type: none">• To be determined
L5	<ul style="list-style-type: none">• To be added
L6	<ul style="list-style-type: none">• To be added

L1B starts @ 1030.