

International Summer School

# "Low Temperature Plasma Physics: Basics and Applications"

October 4 – 9, 2014

Master Class

## "Plasma Kinetics "

October 9 – 11, 2014

Physikzentrum Bad Honnef



**International Chairmen:** L.L. Alves & V. Guerra  
(IPFN/IST, Lisbon, Portugal)

**Scientific Organization:** M. Böke, A. von Keudell, J. Winter (RUB)  
**Local Organization:** V.M. Scharf (RUB)

**Webpage:** <http://www.plasma-school.org>

**Support:**

**RESEARCH DEPARTMENT**  
Plasmas with Complex Interactions

*Arbeitsgemeinschaft  
PLASMAPHYSIK*



**SFB-TR 87**



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# Scope of the Course

## **1. The level of the course.**

The level of the course is aimed at *Ph.D.-students in first year* and *Diploma- and M.-Sc.-students in last year*.

## **2. The aim of the course.**

The aim of the course is to make the students become acquainted with the present status of the field of low temperature plasma physics. It is assumed that the students have followed introductory physics courses in their home university. However, the basic principles will be summarized at the beginning of the course. The course offers a broadening of knowledge in plasma physics and in the interaction of plasmas with surfaces including a description of advanced diagnostics. In addition, the students will be able to interact with the teachers of the course and they will meet fellow-students from other universities in Europe and the rest of the world. Participants are invited to bring with them presentation material in form of posters.

## **3. All lectures and discussions are in English.**

## **4. Well-known experts in the field will present lectures in the following areas:**

- fundamentals of plasma physics,
- plasma sources,
- thermal and low pressure plasmas,
- atomic processes,
- electron kinetics,
- diagnostics and plasma spectroscopy,
- modeling,
- plasma-surface interactions,
- etc.

## Please notice:

### **Breakfast, lunch and dinner:**

Breakfast, lunch and dinner are organized by the Physikzentrum. Please notice that every meal starts punctually.

Breakfast: 7.30-8.30 hours

lunch: 12.15 hours,

dinner: 18.30 hours.

Some lecturers will also stay overnight in the hotel Seminaris and have breakfast in the same hotel. All other meals (and drinks!) will be available at the Physikzentrum – the school location. WIFI is free of charge and a computer room is available as well. There is even a piano: Please bring your music sheets with you!

On Monday evening, there will be the Summer School dinner at 18.30 hours.

**Beverages are not included** in the course fee, except for the drinks during the Summer School dinner on Monday evening. After putting your name on a list, you may take beverages out of the refrigerators. **We kindly ask you to pay** the total amount for your beverages at the front office of the Physikzentrum **before you leave Bad Honnef.**

### **Lecture Notes**

The lecture notes are meant to give support to the students attending the course. Hence, the distribution is restricted to the students attending the course and reproduction of (part of) the lecture notes is not permitted without permission of the authors.

<http://www.plasma-school.org/notes/index.html.en>

User: cpt

Password: Langmuir

### **Poster session**

The Summer School's poster session will take place on Sunday evening on the ground floor. The participants who present posters are kindly asked to display their posters during the whole course.

The Master Class's poster session will take place on Friday during the coffee break.

### **Entrance Physikzentrum**

To enter the Physikzentrum, please use the door code (phone-like keyboard on the right hand side of the main entrance) for entering the Physikzentrum in Bad Honnef. This code is valid during the whole School. **The code is: C2014. C** stands for "clear" and is a reset in a case of a previous error.

# Program of the School 2014

**Saturday, Oct. 4: Arrival/Registration from 17.00 - 21.00 (dinner included)**

**Sunday, Oct. 5:**

08.30-8.45	Welcome and introduction (Plot of the School, Plasma Science) <i>(M. Böke, Bochum &amp; L.L. Alves and V. Guerra, Lisbon)</i>
8:45-10.15	Introduction I: Fundamentals of Plasma Physics <i>(A. von Keudell, Bochum)</i>
10.30-12.00	Introduction II: Fundamentals of Plasma Physics <i>(A. von Keudell, Bochum)</i>
14.00-15.30	Plasma modeling I: Modeling of plasmas <i>(A. Bogaerts, Antwerp)</i>
16.00-17.30	Plasma diagnostics I: Basics of plasma spectroscopy <i>(V. Schulz-von der Gathen, Bochum)</i>
20.00	Poster Session

**Monday, Oct. 6:**

08.30-10.00	Plasma diagnostics II: Measuring electron density and ion flux <i>(N. Braithwaite, Milton Keynes)</i>
10.30-12.00	Plasma sources I: Magnetron discharges <i>(A. Hecimovic, Bochum)</i>
14.00-15.30	Plasma modeling II: Global models <i>(M. Turner, Dublin)</i>
16.00-17.30	Plasma sources II: High pressure thermal plasmas and sources <i>(A. Murphy, Sidney)</i>
18.30	(informal) School Dinner

**Tuesday, Oct. 7:**

08.30-10.00	Plasma modeling III: Electron kinetics in atomic and molecular plasmas <i>(L.L. Alves, Lisbon)</i>
10.30-12.00	Plasma modeling IV: Fluid modeling of discharge plasmas <i>(L.L. Alves, Lisbon)</i>
14.00-evening	<b>Excursion or Workshops</b> Modeling Workshop: "Hands on a Boltzmann solver" <i>(L.L. Alves, Lisbon)</i> Experimental Workshop: "How to get plasma parameters? From theory to reality" <i>(G. Henrion &amp; O. Guaitella, "Réseau Tech. Plasmas Froids", France)</i>

**Wednesday, Oct. 8:**

08.30-10.00	Plasma sources III: DBDs (Corona and barrier discharges) <i>(O. Guaitella, Paris)</i>
10.15-12.15	Plasma sources IV: High density sources: ICPs, Microwaves, ECRs <i>(U. Czarnetzki, Bochum)</i>
14:00-15:30	Plasma diagnostics III: Advanced optical diagnostics <i>(R. Engeln, Eindhoven)</i>
16:00-17:30	Plasma diagnostics IV: Plasma-Surface Interactions <i>(C. Maszl, Bochum)</i>

**Thursday, Oct. 9:**

08.30-10.00	Plasma sources V: CCRF & dusty plasmas <i>(L. Boufendi, Orléans)</i>
10.30-12.00	Plasma technologies <i>(P. Bruggeman, Minnesota)</i>

# Program of the Master Class 2014

Thursday, Oct. 9: Arrival/Registration from 17.00 - 21.00 (Dinner included)

All lectures have duration of ~1.15h + 15min for final extended discussion

Friday, Oct. 10:

08.30-10.00	Electron-scattering cross-sections: measurements & calculations <i>S. Buckman (Canberra)</i>
10.00-10.30	Coffee break
10.30-12.00	Diagnostics on plasma chemistry: unveiling secrets <i>G. Dilecce (Bari)</i>
12.00-13.30	Lunch
13.30-15.00	The state-of-the-art description of vibrational-electronic excitations <i>A. Laricchiuta (Bari)</i>
15:00-16:00	Master Class Poster Session (+coffee and biscuits)
16:00-17:30	Databases for the curation of elementary collisional data <i>S. Pancheshnyi (Zurich)</i>

Saturday, Oct. 11:

08.30-10.00	New perspectives on surface-kinetics <i>D. Marinov (LPP, Palaiseau)</i>
10.00-10.30	Coffee break
10.30-12.00	Kinetic modelling of air plasmas: self-consistency, bottlenecks, successes <i>V. Guerra (Lisbon)</i>
12.00-13.30	Lunch