

9th CAROLUS MAGNUS SUMMER SCHOOL ON PLASMA AND FUSION ENERGY PHYSICS



August 31 – September 11, 2009
Eurovillage, Herbeumont-sur-Semois, Belgium

Organised by the Trilateral Euregio Cluster (TEC) with its EURATOM associated members

ERM/KMS Laboratory for Plasma Physics, Brussels, Belgium
FOM-Institute for Plasma Physics Rijnhuizen, Nieuwegein, The Netherlands
Institute of Energy Research – Plasma Physics, Forschungszentrum Jülich, Germany

Deadline for application:	May 1, 2009
Notification of acceptance:	June 1, 2009
Abstracts of posters:	August 1, 2009
Start of Summer School:	August 31, 2009

The most recent information on the Carolus Magnus Summer School 2009 can be found via this web address: <http://www.carolusmagnus.net/>.

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Together with the FOM-Institute for Plasma Physics Rijnhuizen and the Institute of Energy Research – Plasma Physics at Forschungszentrum Jülich, the Laboratory for Plasma Physics of the Association "EURATOM – Belgian State" in the ERM/KMS (Brussels, Belgium) forms the Trilateral Euregio Cluster (TEC). The TEC is responsible for the organisation of the Carolus Magnus Summer Schools taking place every two years. Most lectures will be given by senior physicists from the three TEC institutes and by academic staff from nearby universities of North Rhine-Westphalia, Belgium and The Netherlands. A few lectures will also be delivered by experts from other laboratories associated in the European Fusion Research Programme and from the EURATOM Directorate of the European Commission.

The 9th Carolus Magnus Summer School will be devoted to the theoretical and experimental aspects of high temperature plasmas confined in toroidal magnetic traps and is relevant to energy production using controlled nuclear fusion. Special emphasis will be laid on tokamaks, but stellarators and spherical devices will also be discussed. The ITER project now officially being underway, increased attention will be paid to physics addressing this next-step device. The Summer School programme typically also contains two evening lectures on subjects outside the fusion research scope but closely related to it.

The Summer School is primarily intended for Ph.D. students and undergraduates in their last year. Experienced scientists who, coming from other disciplines, recently entered the field of plasma physics and fusion will also benefit from the School, which not only provides an overview of the various interconnected research domains but also describes the latest developments in various aspects of fusion research.

The proceedings of the Summer Schools are published as a special issue of the scientific journal *Transactions of Fusion Science and Technology*. The participants will receive a copy of the proceedings. The slides and corresponding papers of the various lectures are also available on the Carolus Magnus Summer School's website.

Participants will have the opportunity of presenting and discussing their own work during two special poster sessions, for which they should send one-page abstracts to the conference secretariat before August 1, 2009.

An excursion will be organized to the Institute of Energy Research – Plasma Physics at Forschungszentrum Jülich, hosting the TEXTOR tokamak.

ACCOMMODATION AND FEE

The 9th Carolus Magnus Summer School will be held in Eurovillage, Herbeumont-sur-Semois, a leisurely spot in the Belgian Ardennes. Take a look at the website www.corsendonkvillage.be to get an impression.

On the free weekend in between the two-week lecture period, participants can enjoy walking through the Ardennes or they can take a train and visit Brussels or other nearby cities. Except for breakfast, the weekend meals are not included in the participation fee. [Herbeumont](#) is a small village that counts approximately 700 inhabitants and is tucked away in the dense woods at the right bank of the river Semois. It is a beautiful authentic place that radiates rest. Nature is magnificent here and the Semois as well as the former railway line (with splendid bridges and tunnels) dominate the surrounding area. Just outside the village centre, at the right bank of the Semois, the remains of a castle from the 11th century, built by Jehan de Rochefort, are to be found. Until the middle of the 17th century the castle served as residence for the counts of Herbeumont. It was destroyed by the troops of "Sun King" Louis XIV. From the ruins, you have a splendid view over the valley of the Semois. There are also numerous places of interest to visit nearby: Bouillon, Orval, the impressive valley of the Semois, Torgny, the slate quarry of Herbeumont, the book village Redu and the Space Centre. At a distance of approximately 13 kilometres, you will find the city of Bertrix, a relatively large place with shops, supermarkets, restaurants and a train station.

The fee, including accommodation, meals and proceedings amounts to **800 Euro**. During the weekend of September 5th and 6th only the breakfast is included in the fee. Limited support to students from non-EU countries will be discussed on request on a case-to-case basis. As the Carolus Magnus Summer School is a non-profit organization, the extent of the support we can give depends on the sponsoring we get. All applications for funding should be accompanied by a recommendation of the scientific supervisor.

The deadline for registration is May 1, 2009. The acknowledgement of receipt will be sent within a few weeks after the application is received. In the case of electronic registration an email confirming the receipt is sent to the applicants immediately. Attendance is limited to approximately 55 students and early application is recommended. Applicants will be notified about their acceptance by June 1, 2009. Practical information will be made available to successful candidates approximately one month before the Summer School begins.

PRELIMINARY PROGRAMME

Introduction

- Energy resources and reactor safety
- European fusion programme
- Thermonuclear burn criteria

Confinement concepts

- Magnetic fields and plasmas
- Guiding centre motion
- Tokamaks
- Stellarators
- Plasma equilibrium in tokamaks
- Operational limits

Theoretical description of plasmas

- Kinetic and gyro-kinetic description
- Macroscopic description

Waves and instabilities

- Propagation and absorption in confined plasmas
- Ideal and resistive MHD instabilities
- Micro-instabilities

Plasma heating and current drive

- Neutral beam injection
- Wave heating (ECRH, ICRH)
- Current drive (ECRH, ICRH, Lower Hybrid, NBI)

Transport in tokamaks

- Classical, neoclassical and anomalous transport
- Fluctuations in tokamaks
- Degraded and improved confinement
- Transport studies using perturbative experiments
- Transport codes

Diagnostics

- Microwave, optical and spectroscopic diagnostics for the plasma core and edge, equilibrium and fluctuations

Edge plasma physics

- Plasma-wall interaction and wall conditioning
- Ash removal, recycling
- Radiation phenomena at the edge and in the divertor
- Divertor concepts

Present status of fusion

- Overview of tokamak results
- Scaling and extrapolation to reactors
- Advanced tokamak concepts

PRELIMINARY LIST OF LECTURERS

ERM / KMS, Brussels

F. Durodié
R. Koch
J. Ongena
D. Van Eester
M. Van Schoor

FOM-Institute for Plasma Physics Rijnhuizen, Nieuwegein

H.J. de Blank
M. de Baar
A.J.H. Donné
G.M.D. Hogeweij
R. Jaspers
G. Van Rooij
E. Westerhof

IEF Plasma Physics, Forschungszentrum Jülich

H.R. Koslowski
A. Krämer-Flecken
A. Kirschner
D. Reiter
U. Samm
B. Schweer
M.Z. Tokar
B. Unterberg

Others

H. Bartlett	(European Commission, Brussels)
K. Crombé	(University of Ghent)
G. Federici	(ITER, Garching)
X. Garbet	(CEA, France)
D. Hartmann	(Max-Planck-Institut für Plasmaphysik, Garching)
R. Keppens	(CPA, Leuven)
V. Kiptily	(JET, Culham)
P.U. Lamalle	(ITER, Cadarache)
J. Linke	(IEF-2, Forschungszentrum Jülich)
M. Rubel	(KTH, Stockholm)
S. Sharapov	(JET, Culham)
G. Van Oost	(University of Ghent)
B. Weyssow	(EFDA, Garching)
H.R. Wilson	(UKAEA Fusion, Culham)
R. Wolf	(Max-Planck-Institut für Plasmaphysik, Greifswald)

Special Evening Lectures

S. Poedts	(CPA, Leuven)
A. Von Keudell	(Ruhr-Universität Bochum)

APPLICATION

Preferably, please apply electronically via our web server:
www.carolusmagnus.net/registration

otherwise, please return this form to the address overleaf.

First name:	
Last name:	
Title:	
Affiliation:	
Department:	
Street / P.O.Box:	
Zip code:	
City:	
Country:	
Email:	
Phone:	
Fax:	

Your present level:

- graduated bachelor, preparing a master's degree or equivalent
- graduated master or equivalent, preparing a PhD
- post doc
- other, please specify :

- I intend to present a poster contribution entitled:

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Accommodation and fee: 800 EUR

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ORGANISATION

The 9th Carolus Magnus Summer School on Plasma and Fusion Energy Physics is organized by the three partners in the Trilateral Euregio Cluster (TEC):

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B – 1000 Brussels, Belgium

Association EURATOM – FOM

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P.O. Box 1207
NL – 3430 BE Nieuwegein, The Netherlands

Association EURATOM – FZJ

Institute of Energy Research – Plasma Physics
Forschungszentrum Jülich
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All correspondence should be directed to the scientific secretariat:

Dr. Ernesto Lerche

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