

Zapraszamy wszystkich zainteresowanych, w tym doktorantów MSD IFJ PAN, do udziału w

Seminarium Współpracy Naukowej CEA/PAN

„Wybrane problemy fizyki plazmy”

Środa, 7 września 2016, Instytut Fizyki Jądrowej im. H. Niewodniczańskiego
PAN, ul. Radzikowskiego 152, Kraków, sala 4402 (IV p. budynku nr 4)

11.00 – 12.00 Didier MAZON (*Institut de Recherche sur la Fusion par
confinement Magnétique, CEA Cadarache*)
Tokamak principles, heating, current drive and key issues

Abstract: The general frame of this talk treats the perspective of a real-time control of tokamak plasmas in view to attaining continuous operation. This means to be able to maintain the plasma in a stable and quasi stationary state for several hours. It is also necessary to keep a sufficient efficiency so as to produce at least 10 times more energy than what is requested for the functioning of the tokamak. These extremely ambitious objectives are absolutely essential to get closer to a viable reactor and require first of all an experimental and theoretical understanding of the relevant physical phenomena. We will insist in particular on the preponderant influence of the current density profile for reaching high performance discharges.

13.15 – 14.15 Yves PEYSSON (*Institut de Recherche sur la Fusion par
confinement Magnétique, CEA Cadarache*)
*First principle calculations of heating and current drive by rf
waves in tokamaks*

Abstract : The current density and pressure profiles are key parameters in order to achieve steady-state burning thermonuclear plasmas in a tokamak magnetic configuration. Their control is a considerable challenge, and among available tools, rf waves interacting with fast electrons are particularly attractive thanks to their versatility and efficiency. In this context, first principle calculations are performed by numerical codes that incorporate all multiple scales at play in a hot magnetized plasma, allowing quantitative comparisons between results of modeling and experiments. After a general introduction of heating and current drive in tokamaks, the background of C3PO ray tracing and LUKE solver of the 3-D (2-D in momentum space, 1-D in configuration space) of the linearized, bounce-averaged relativistic electron Fokker-Planck equation is presented. Simulations of heating and current drives in existing tokamaks but also in ITER are discussed for rf waves at the Lower Hybrid and Electron cyclotron frequencies, with quantitative comparisons between fast electron bremsstrahlung calculated with the R5-X2 radiation code. Further theoretical and numerical developments for the coming years are presented.

Prof. Urszula Woźnicka
Dr hab. Andrzej Horzela