7th European Conference on Controlled Fusion and Plasma Physics

Lausanne, Switzerland, 1-5 September 1975

The Seventh European Conference on Controlled Fusion and Plasma Physics was held by the Plasma Physics Division of EPS at Lausanne, on the shore of the Lake of Geneva. The increased interest in the field was demonstrated by the large number of papers submitted to the Conference and the participation of more than 400 people from 30 countries. About a quarter of the participants came from 9 non-European countries.

The scientific programme had been elaborated by the Paper Selection and Programme Committee, consisting of H.A.B. Bodin (Culham), B. Lehnert (Stockholm), C. Mercier (Fontenay-aux-Roses), and G. Wolf (Jülich). As 200 contributed papers had been accepted, the number of parallel sessions had to be brought to four. In the mornings 22 invited papers, treating subjects of broader interest and particular topicality, were read in plenary sessions.

The invited papers indicate the broad lines of present research:

— Evolution of Discharges in TFR and Internal Disruptions (P. Launois, Fontenay-aux-Roses)
— Recent Results on ALCATOR (L. Th. M. Ornstein, Jutphaas)
— Extension of Confinement and Neutral Injection Experiments in ORMAK to Higher Parameters (J. F. Lyon, Oak-Ridge)
— Plasma Heating by High Power Relativistic Electron Beams (M. V. Babykin, Moscow)
— Survey of US Laser Fusion Programme (G. W. Kuswa, Washington)
— Hydrodynamics and Compression of an Irradiated Target (J.M. Reisse, Limeil)
— Recent Mirror Machines Results and their Implications for Mirror System (R. Post, Livermore)
— Survey of the Results of Tokamak Research in USSR (K.A. Razumova, Moscow)
— Microinstabilities and Beam Heating Experiments in the Culham Superconducting Levitron (A.C. Riviere, Culham)
— Belt Pinch Experiments (F. Hofmann, Lausanne)
— Recent Toroidal High-Beta Stellarator Experiments at Garching (J. Neuhauser, Garching)
— Lower-Hybrid Heating of Large Tori Using Waveguides (M. Brambilla, Grenoble)
— On the Parametric Heating of Thermonuclear Interest (A. Rogister, Jülich)
— Investigations on the Disruptive Instability in Pulsator (O. Klüber, Garching)
— X-Ray Measurements on the ST Tokamak (S. von Goeler, Princeton)
— Impurity Evolution in TFR Plasmas (C. de Michelis, Fontenay-aux-Roses)
— Experimental Results on JAERI Tokamaks (Y. Shimomura, Tokai)
— Objectives of the JET Experiment (P. Noll, Culham)
— MHD Stability of Tokamaks (J. Wesson, Culham)
— Report on the Dubna Large Tokamak Workshop (E.I. Kusnetsov, Moscow)
— Density Diagnostics of the Supercompressed Laser Thermonuclear Targets (F. A. Nikolaev, Moscow)
— Collective Ion Acceleration with Relativistic Plasma Rings (C. Andelfinger, Garching)

The programme has reflected the strong emphasis given in fusion research to work on low-β plasma confinement in toroidal geometry, and in particular in Tokamaks. In the Tokamak field a large number of new experimental results has been reported which yield more precise insight into the physics of these devices. The present limits on plasma confinement are essentially given by high-charge impurity ions entering into the plasma from the wall and by macroscopic instabilities, causing pulsations of the plasma, which appear if the plasma current is increased. Work on methods for keeping the plasma clean by reducing its interaction with the material walls and possibly by influencing the transport of impurity ions, as well as the use of supplementary energy sources to heat the plasma and control the plasma current profile, is therefore of great importance for the immediate future. Intense preliminary investigations are in progress in these fields, in particular on the high-frequency heating techniques. In different Tokamaks it could be shown that the confinement time increases with the plasma density, but there is so far no theoretical understanding of this fact. The large Tokamak devices under design and expected to be functional in the early eighties (JET in the European Community, T-20 in the USSR, TFTR in the USA, and JT-60 in Japan), which aim at generating plasma discharges of plasma currents around and above 3 MA, were discussed for the first time at an EPS meeting.

In the field of high-β toroidal confinement studies on the establishment of the reversed-field configuration and on the instabilities appearing in the high-β stellarator are to be mentioned. Improvements of the discharge life time and investigations on the discharge dynamics have been reported also for screw and belt pinches.

The experiments on the compression and heating of dense targets by laser and relativistic electron beams continue to concentrate on the study of the dynamics of the implosion. For obtaining a deeper insight into the process refined diagnostical methods must be developed. It was possible to show that a good isotropy of illumination of the pellet can be obtained also with relativistic electron beams.

In the field of plasma confinement in magnetic mirrors a more stable behaviour of the plasma has been observed in the presence of a warm plasma stream along the magnetic field, able partially to fill the loss cone. An increase of the plasma confinement time by an order of magnitude was reported.

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