(Vienna). Capture preferentially takes place at curve crossings and it has been found that the most effective crossings are those occurring between 5 and 10 a_0. Some aspects of the importance of these processes were given by D. Péquignot (Meudon) in his overview of astrophysical plasmas.

Basic for any understanding of the physics of highly charged ions are the specific effects seen in spectra for high Z. These were discussed in overviews by H. G. Berry (Argonne National Laboratory), R. D. Cowan (Los Alamos National Laboratory), and M. Klapisch (Jerusalem). Berry described tests of relativistic and QED effects while Cowan stressed the importance of taking autoionization into account. Klapisch discussed his recent work with the so-called "unresolved transition arrays" and gave a speculative outlook into the future.

Five invited overviews of a speculative nature were also given: M. Barat (Orsay) speculated on the high-resolution energy-loss (gain) experiments to be performed in the future and what they might unravel. S. Bliman (Grenoble) described future problems connected with photon spectroscopic studies while C. Bunge (Mexico City) discussed computational methods to be used in studying core-excited few-particle systems. S. Datz (ORNL) speculated on future experiments with highly charged ions and solids while, finally, M. L. Gaillard (Lyon) gave a personal view of what will happen when the techniques of laser spectroscopy are combined with those of highly charged ion spectroscopy.

It is the private opinion of the author of this summary that all overviews, progress reports, and poster contributions (not summarized here) were carefully prepared, skillfully delivered, and of high scientific quality. I hope this will be reflected in the proceedings of the symposium, which will be published as a topical issue of *Physica Scripta* in late 1982 or early 1983. The estimated price (for those not subscribing to *Physica Scripta*) is $30 to $50. For information, write to The Royal Swedish Academy of Sciences, Publications Department, Box 50005, S-104 05 Stockholm, Sweden.

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REPORT ON THE 5TH INTERNATIONAL CONFERENCE ON PLASMA/SURFACE INTERACTIONS IN CONTROLLED FUSION DEVICES, GATLINBURG, TENNESSEE, MAY 3-7, 1982

This international conference, sponsored jointly by Oak Ridge National Laboratory (ORNL) and the Office of Fusion Energy, U.S. Department of Energy (OFE, DOE), heard 14 invited and 149 contributed papers on plasma edge physics, recycling, fueling, impurity control, divertors, pumped limiters, thermal processes (disruptions), hydrogen trapping, detrapping and diffusion, helium implantation, retention and re-emission, coatings, diagnostics, and other ion/solid interactions.

Major plasma physics laboratories in America, Western Europe, Japan, and the Peoples' Republic of China were represented at the meeting. Due to a decision of the Soviet Union's government, there was unfortunately no Soviet participation. There were 197 participants; 84 were from foreign laboratories.

Eight invited talks dealt with important current areas in plasma/surface interactions in fusion devices. The presentation of D. H. Goodall (Culham Laboratory) showed the results of using high-speed cine cameras as a diagnostic aid in the investigation of plasma phenomena. Results were shown for many tokamaks, i.e., Axially Symmetric Divertor EXperiment (ASDEX), Divertor and Injection Tokamak Experiment (DITE), Divertor Assembly, Impurity Studies Experiment, JAERI Fusion Torus-2, and Tokamak Fontenay-aux-Roses. Plasma behavior including disruptions, formation of magnetic islands, limiter shadow, and transient phenomena, was shown. This technique gives a spectacular illustration of some of the more dramatic forms of plasma/wall interactions and its use in detailed analysis of plasma behavior was the subject of lively discussion. F. Waelbroeck (Kernforschungsanlage-Jülich) reviewed thermally activated processes in hydrogen recycling and P. Mioduszewski (ORNL) described the new and important area of pumped limiters. Models for determining the performance of poloidal gas target divertors were summarized by D. E. Post [Princeton Plasma Physics Laboratory (PPPL)]. Comparison of pumped and gaseous divertors is a key topic in near-term experiments and has serious consequences for the feasibility of International Tokamak Reactor-scale reactor designs. A Miyahara [Institute for Plasma Physics (IPP), Nagoya University] discussed plasma material problems in burning plasma experiments and concentrated on the proposed Japanese R-tokamak. The area of thermal processes including disruptions was addressed by H. Vernickel (Max-Planck Institute for Plasma Physics, Garching). P. Staib (Max-Planck Institute for Plasma Physics, Garching) described various probe systems that have been developed and utilized in studying the outermost plasma layer. He showed that there now exists convergence in the data taken with different types of probes in different machines although there are still some areas of inconsistency. D. Mattox (Sandia National Laboratories) discussed the requirements of coatings for in-vessel components in advance fusion reactors.

D. Meade (PPPL) moderated a special invited symposium on recent divertor experiments. Recent results for the major divertor experiments were described; DITE, P. C. Johnson (Culham Laboratory); ASDEX, W. Engelhardt (Max-Planck Institute for Plasma Physics, Garching); Poloidal Divertor Experiment (PDX), R. J. Fonck (PPPL); Doublet III, M. Ali Mahdavi (General Atomic), and M. Shimada [Japan Atomic Energy Research Institute (JAERI)].

First results comparing operation with a poloidal divertor and operation with a toroidally closed limiter (both stainless steel and graphite were used) were given for ASDEX. Initial results showed that diverted discharges were considerably cleaner and easier to create. Experimenters on PDX found that poloidal divertor discharges with up to 5 MW of injected power were cleaner than similar limiter discharges. They also announced that the average beta had been raised to 3.2% for low magnetic field circular discharges with high-power neutral beam injection using a graphite limiter. Comparison with divertor discharges under the same conditions will be made in the near

future. The U.S. investigators on Doublet III found that for expanded boundary divertor plasmas, injection of argon into the discharge results in a steady-state concentration of argon that is two orders of magnitude higher in the divertor plasma than in the main discharge. The JAERI investigators on Doublet III found that use of an open divertor compresses helium ash as well as hydrogen neutrals near the divertor and establishes the feasibility of helium ash exhaust by an open divertor. M. Keilhacker (Max-Planck Institute for Plasma Physics, Garching) summarized the present understanding of divertor operation and put in perspective the needs of future ignition-oriented tokamaks and fusion reactors.

One hundred and fifty contributed papers were presented and were divided into oral and poster sessions. The impression obtained by this "author" was that the plasma/surface interactions community has come to recognize many specific areas of need in controlled fusion and is addressing many of the pertinent problems. While much has been learned in many areas, the door has only been opened in some areas, e.g., pumped limiter, plasma/limiter interactions, and erosion of in-vessel components. These papers are in the referee/editing process and were scheduled to be published in the *Journal of Nuclear Materials* in late 1982. The proceedings can be purchased directly from North Holland Publishing, Amsterdam, for approximately $120 and a limited number of abstract books are available from the chairman at $20 per copy.

At the International Advisory Committee meeting chaired by T. Ruether (OFE, DOE), the committee accepted the invitation made by A. Miyahara (IPP, Nagoya University) that the 6th Conference be co-sponsored by IPP, Nagoya, and JAERI and be held in Japan in late spring of 1984.

Robert A. Langley, Chairman
5th International Conference on Plasma/Surface Interactions in Controlled Fusion Devices

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