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Final Report on
The ICFA Advanced Beam Dynamics Workshop
Space Charge Dominated Beam and Application of High Brightness Beams
at Indiana University
for the Funding Period Sept. 1, 1995 - Aug. 31, 1996

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The Final Summary Report on the ICFA workshop (DOE-FG02-95ER40942)

The last workshop on space charge dominated beams was in 1978 at the Los Alamos National Laboratory and the last workshop on the application of high brightness beams was in 1991 at the University of Maryland. Therefore it was considered timely to have a workshop dealing with the space charge problem in high brightness particle beams.

The workshop on space charge dominated beams was approved by the ICFA beam dynamics panel and preparation on the workshop began in December 1994. The organization and program committee were quickly formed from experts in the US, Europe and Japan and consisted of:

Ben B. Brabson (Indiana University)
Yanglai Cho (Argonne National Laboratory)
Alex Friedman (Lawrence Livermore National Laboratory)
Samar K. Guharay (University of Maryland)
Patricia Halstead (Indiana University, Workshop Secretary)
Ingo Hofmann (GSI)
Steve Holmes (Fermilab)
K.J. Kim (Lawrence Berkeley Laboratory)
S.Y. Lee (Indiana University)
Roger Miller (Stanford Linear Accelerator Center)
Y. Mori (KEK)
Gunther Plass (CERN)
Grahame Rees (Rutherford)
Martin Reiser (University of Maryland)
Thomas P. Wangler (Los Alamos National Laboratory)
W.T. Weng (Brookhaven National Laboratory)

On the workshop organization, Ms. Pat Halstead provided a great help. Planning the workshop's agenda was done mainly through e-mail saving time and traveling expenses. As the program began to take shape, we realized that the original choice of a 2.5 day workshop was insufficient to accomplish our goal. Despite the lack of time, we worked hard and managed to complete our workshop in time.

The workshop took a closer look at major breakthroughs occurring in the past few years. The mechanism of halo formation, which has been actively studied in the past few years, was a major topic in this workshop. The thermalized beam with the Vlasov-Fokker-Planck approach for non-KV beams received a major attention and became a joint

session. The design of neutron spallation sources evolved into another session. Yet another working group focused on the space charge effects in high brightness electron beams near the source and quasi-isochronous storage rings.

There are about 100 physicists from Europe, Russia, Japan and the United States participate two and half a day workshop. It is a workshop participated by beam physicists from many different disciplines, e.g. plasma physics, high brightness electron beam physics, heavy ion fusion, high energy collider, and intense ion beam for neutron spallation sources.

The results garnered from this workshop are divided into following sections:

- Topics of General Interests
- Experiments with Space Charge Dominated Beams and Halo Formation
- Statistical and Fokker-Planck Methods
- Neutron Spallation Sources
- Heavy Ion Inertial Fusion
- High Brightness Electron Beams.

There are 42 contributed papers and one summary paper derived from panel discussions published in the AIP conference proceedings No. 377. In this final report, five copies of the published proceedings are included.

- * "Preliminary Design for an Advanced Ceramic Air Heat Exchanger Integrated in a Gas Turbine Power Generation Cycle" B.D. Harkins, M.E. Ward Solar Turbines Incorporated; Presented at the Annual Meeting of the American Institute of Chemical Engineers, November 1991, Los Angeles, CA.
- * "Evaluation of SiC/SiC Composites for Heat Exchanger Applications" B. D.Harkins, V. Parthasarathy, Solar Turbines Incorporated; W. Beyermann, AMERCOM; J. Keiser, W. Elliot, M. Feber, Oak Ridge National Laboratory; Presented at the Annual American Ceramic Society, January 1992, Coca Beach, FL.
- * "Development of a High Pressure Heat Exchange System (HiPHES) "B.D. Harkins Solar Turbines Incorporated, Presented at the Department of Energy Advanced Heat Exchangers Program Review, February 1992, Herndon, VA.
- * "Preliminary Design of a High Pressure, High Temperature Ceramic Air Heat Exchanger" B.D. Harkins, M.E. Ward Solar Turbines Incorporated; Presented at ASME Winter Meeting 1989, San Francisco, CA.