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## PREFACE

The Fourteenth Workshop on Advanced Accelerator Concepts was held at Loews Annapolis Hotel in Annapolis, MD from June 13 through June 19, 2010. The Workshop was sponsored by the Office of High Energy Physics of the U.S. Department of Energy, and was organized by the University of Maryland, College Park, MD.

This workshop was the fourteenth in a series that began with a workshop on Laser Acceleration of Particles that was held at Los Alamos National Laboratory in February 1982 (see AIP Conf. Proc. 91). Over the past 28 years, these workshops have been dedicated to advancing beyond the limits of conventional accelerator science and technology by employing new concepts and exploiting new technologies. The field has grown substantially over this period of time in both scope and participation. The first workshop had 65 participants, while this workshop had 220, including about 60 students. The first Proceedings had 20 papers, apparently constituting the majority of papers presented at the workshop, while this workshop had more than 240 technical presentations. In fact, this success comes with its own growing pains, as this Workshop comes to more closely resemble a conference, with the majority of papers presented in six parallel working groups. These Proceedings contain six working group summaries plus 9 plenary and 115 contributed papers.

The six Working Groups of the 2010 AAC Workshop Program were organized as follows. Working Group 1 was focused on laser-driven particle acceleration using a plasma medium, and studied a variety of issues including beam quality, staging, and diagnostics. Working Group 2 dealt with computational tools for simulating plasma-based wakefield accelerators, high gradient structures, and high brightness beam sources. Working Group 3 was concerned with the high gradient structures driven by either rf or laser sources, with a focus on understanding and extending the gradient limits and the development of new advanced accelerating structures. Working Group 4 considered progress on e-beam driven plasma-based accelerators and the plans for future experiments on the FACET and BELLA facilities. Working Group 5 covered a variety of topics in beam and radiation generation, monitoring, and control. Working Group 6 evaluated a variety of advanced concepts, including laser-driven ion acceleration, muon colliders, positron production, and some innovative electron accelerator schemes that were not covered by the other working groups. There were also sixteen invited plenary presentations covering major areas of interest across all the Working Groups

The second AAC Prize was awarded at this workshop for outstanding contributions to the science and technology of advanced accelerator concepts. The 2010 AAC Prize winner was Dr. Robert Palmer of Brookhaven National Laboratory. This prize is sponsored by Bergoz Instrumentation, and the winner was selected by the AAC Prize Selection Committee chaired by Ilan Ben-Zvi. In addition, prizes were awarded for outstanding student poster presentations, with the winners selected by

the leaders of the working groups. The winners were: Michael Helle (Naval Research Laboratory), Brian Layer (University of Maryland), Chris McGuinness (SLAC), Arthur Pak (UCLA), Satomi Shiraishi (LBNL), and Frank Lee (University of Nebraska).

These Proceedings are organized as follows. Invited plenary papers are printed in the order that they were presented. Next, the six working group summaries are presented, prepared by the leaders of the Working Groups. Following these summaries, the contributed papers are published, organized by working group and then loosely by topic within each working group.

We wish to thank the Program Committee and the Working Group leaders for assembling an interesting and cohesive program. We wish to thank the local Organizing Committee for selecting an excellent venue for this workshop and for producing a very well run meeting. We also offer special thanks to the following University of Maryland personnel: from IREAP, Margaret Hess (grant management) and Dottie Brosius (workshop website), and from Conference and Visitors Services, Lisa Press and Alison Long (workshop and hotel logistics.)

We would like to acknowledge the financial support of the Office of High Energy Physics, U.S. Department of Energy, and of the Institute for Research in Electronics and Applied Physics, the Department of Electrical and Computer Engineering, the Institute for Physical Science and Technology, and the Department of Physics of the University of Maryland, College Park, MD. We are also grateful for the financial support provided by our industry sponsors: Amplitude Technologies, Bergoz Instrumentation, Coherent Inc., Fastlite, Femtolasers, Inc., RadiaBeam Technologies, Spectra-Physics Lasers, Tech-X Corporation, Thales Optronique, and Thorlabs.

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