

A renewal proposal is made to continue operation of the Basic Plasma Science Facility (BaPSF) at the University of California, Los Angeles (UCLA), and to support the vigorous research program of the BaPSF scientific staff, as well as to continue the improvements in scientific instrumentation required to maintain worldwide leadership in fundamental plasma research. BaPSF provides national and international scientists access to unique research devices and diagnostic tools that permit the exploration of a wide range of fundamental plasma problems that impact topics at the frontiers of fusion, space science and plasma technology. The broad parameter ranges accessible in the plasma devices operated at BaPSF allow studies that span microscopic phenomena on the fast electron time scales (e.g., electron plasma waves, cyclotron radiation) to the slow time scales characteristic of plasma transport driven by drift-wave turbulence and long wavelength magnetic fluctuations. Qualified researchers and research teams from universities, national laboratories and industry can perform experiments at BaPSF, free of charge, upon approval of their proposals by the BaPSF Scientific Council composed of senior scientists broadly representative of the plasma community. The BaPSF plasma devices provide effective platforms for the training of graduate students because of their optimum, mid-scale size. They also provide a fertile environment for the development of junior professors by allowing them to focus entirely on scientific research without the burden of hardware maintenance and construction. BaPSF also operates a small, dedicated plasma device to train high school teachers and students enrolled in the outreach LAPTAG program.

Intellectual Merit: The BaPSF allows the detailed study, under controlled conditions, of fundamental questions in plasma science that cannot be addressed in any other laboratory. The results obtained impact a wide range of frontier topics in fusion and space plasma research. It also lays the foundation for future developments in plasma technology. Through creative development of plasma sources and the operation of complementary plasma devices exploited through focused campaigns, the operation of BaPSF constitutes a transformative concept within plasma science.

Broader Impacts: One of the broader impacts of the BaPSF is that it provides unique opportunities in the training of junior researchers from both large and small institutions, as well as high school students and teachers. BaPSF fosters and engenders collaborations between domestic and international institutions and scientists from diverse areas, such as fusion, space and industrial applications. The topical campaigns made possible by BaPSF provides a forum for the interaction of experimentalists, theoreticians and modelers from varied backgrounds, promoting the cross-fertilization of ideas and techniques.