

Proposal Review 2 : 1535595

Agency Name:	National Science Foundation
Agency Tracking Number:	1535595
Organization:	
NSF Program:	Accelerator Science
PI/PD:	Rubin, David
Application Title:	Electron Cloud Trapping in High Energy Accelerators
Rating:	Very Good

Review

In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to intellectual merit.

The electron cloud effect can significantly limit the performance of beam in many particle accelerators. In this proposal, the applicants proposed to build a new electron cloud detector to further our understanding of the growth and decay of the electron cloud in quadrupole fields. The proposed research builds on the the initial observation of electron trapping at the Cornell Electro Storage Ring (CESR) magnets and will further advance the detailed study of those trapped electrons to determine dependence of cloud properties on quadrupole field strength with different types of beams and bunch charges and the effectiveness of a clearing bunch. The strength of this proposal is the availability of the CESR accelerator and the large amount of experience in electron cloud study on this accelerator by this group during the past several years. The proposed activities are well organized including design, fabrication, installation, and commissioning; a clear time line is defined in the proposal. The PI of this proposal, Prof. Rubin, led the conversion of the Cornell electron/positron collider to CESR Test Accelerator and has many years' experience in accelerator design and instrumentation. The Cornell Electron Storage Ring (CESR) accelerator facility will provide the basic accelerator infrastructure for the proposed beam tests.

In the context of the five review elements, please evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

The success of this project could lead to a better understanding of electron cloud trapping in accelerator magnets and a more effective way to mitigate these effects. This will help to improve beam quality in many accelerator facilities. Since the accelerator as a powerful tool in the study of material science, biology, nuclear and high energy physics, this proposal could have a broad impact in general. This proposal also provides an opportunity to train undergraduate, graduate and postdoctoral students through design, measurement, and simulation proposed in this project.

Please evaluate the strengths and weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if applicable

Summary Statement

In summary, this proposal is well-written with clear background information, proposed work and activity working plan. The success of this project could provide a better understanding/mitigation of the electron cloud effects and an opportunity to train students in accelerator science. It should be supported if the funding is available.