# Proposal Review 4 : 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:	Multiple Rating: (Very Good/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 build-up effect is a well known phenomenon in high-energy particle accelerators. High density of low-energy electrons build up inside the vacuum chamber of a proton synchrotron and proton or positron storage rings. These electrons can lead to emittance growth, beam instabilities and heat load the cryogenically cooled rings. The goal of this proposal i understanding of the behavior of electron cloud observed to be trapped in the fields of quadrupole magnets. Such trapped cloud may limit the spacing of bunches in proton and positron synchrotrons and storage rings, and ultimately limit the beam quality and intensity. This will continue to be an important issue in the upgraded LHC and the proposed FCC machines.

#### In the context of the five review elements, please

#### evaluate the strengths and weaknesses of the proposal with respect to broader impacts.

The PI proposes to install a quadrupole magnet with a shielded electrode detector for measuring the flux of cloud electrons into the wall of the chamber, and with resonant microwave dete measure the density of electrons in the chamber volume. The quadrupole will be installed in the Cornell electron/positron storage ring test accelerator (CESRTA) and used to measure clou properties under a variety of beam conditions as a function of quadrupole field strength. The designs of the two types of detectors are based on prior CESRTA experience. Simulation code further developed to aid in the interpretation and analysis of the data. The availability of the CESTRA facility makes this project doable with a high probability of learning valuable and relev information.

#### Please evaluate the strengths and

# weaknesses of the proposal with respect to any additional solicitation-specific review criteria, if applicable

The undergraduate, graduate and postdoctoral students trained through this program will have the opportunity to operate the state-of-the-art particle accelerators that are at the heart of th investigations of the accelerator technology and the properties of accelerated beams. Cornell has a well established accelerator physics program and an excellent track record of training traditional accelerator physicists. The requested funding is very reasonable and the PI and his team is extremely competent to carry out this work.

## Summary Statement

This proposal is extremely clearly written with a very well articulated focus. The facilities at Cornell are ideally suited for carrying out this project. The only wrinkle is that the funding reques seems to be for 5 technician/accelerator physicists with no involvement of any graduate student(s). The project will be carried out in 12 months. Is this not a worthy enough project to produ PhD thesis?