

Abstract Submitted  
for the DPP20 Meeting of  
The American Physical Society

**Surface Mounted Impedance Probe Antenna as a ThinSat Spacecraft Payload**<sup>1</sup> BRIAN KAY, US Air Force Institute of Technology, ROYCE JAMES, US Coast Guard Academy/US Air Force Institute of Technology, RICHARD FREEMAN, LORRAINE ALLEN, US Coast Guard Academy, ERIK TEJERO, US Naval Research Laboratory, Plasma Physics Division — Collaborations utilizing small spacecraft in near earth orbit between the U. S. Coast Guard Academy (CGA), Navy Research Lab (NRL), the U. S. Naval Academy (USNA), and the Air Force Institute of Technology (AFIT) have initiated scientific and engineering space-based experiments. We have constructed an impedance probe payload for launch in Fall 2021 derived from the existing ‘Space PlasmA Diagnostic suite’ (SPADE) mission operating from NASA’s International Space Station. Currently both space and laboratory plasmas are investigated with AC impedance measurements using a radio frequency antenna. Plasma electron density data collected from the ThinSat will however use an innovative surface mounted dipole antenna to gather the required sheath-plasma and plasma resonance information. On that same launch, a compact multispectral ‘Pixel Sensor’ with a 450 nm - 1000 nm spectral range will add to the existing Inertial Motion Unit, Temperature Sensor, Infrared Sensor, and Energetic Particle Detector baselined in previous launches. We have designed, built, and assembled custom components while and NRL will test the functionality of the antenna in their Space Plasma Simulation Chamber then low altitude launch tests will be conducted. Impedance probe optimization, data collection obstacles, solutions, and procedures will be reported.

<sup>1</sup>\*Supported by U.S. DEPS Grant [DE-JTO] PRWJFY19

Royce James  
US Coast Guard Academy/US Air Force Institute of Technology

Date submitted: 06 Aug 2020

Electronic form version 1.4