



# Christopher Roper

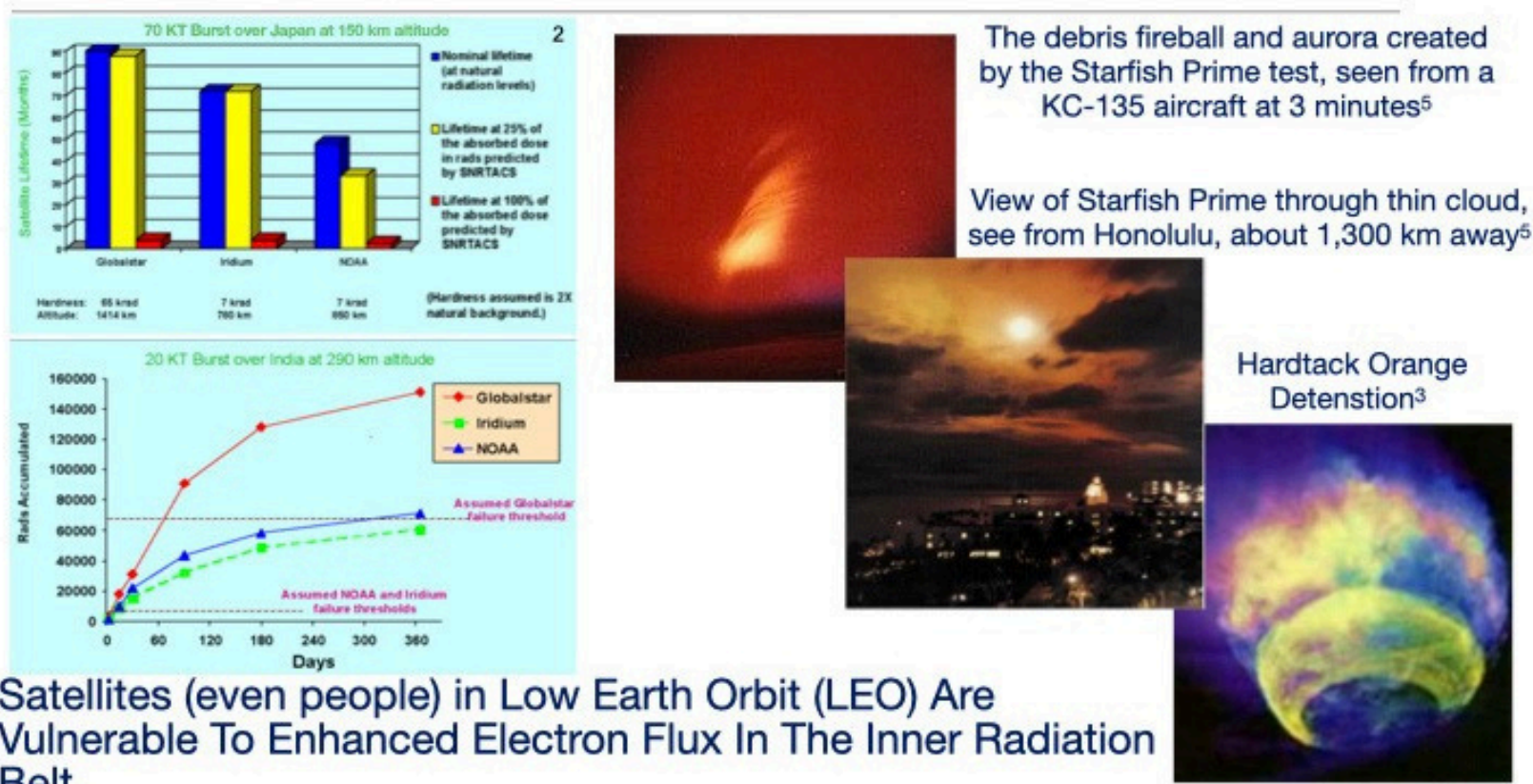
Ph.D. Student, Aerospace Engineering Third Year ARCS Scholar Dr. Burke/Dodson Award



## Using beams to save the world

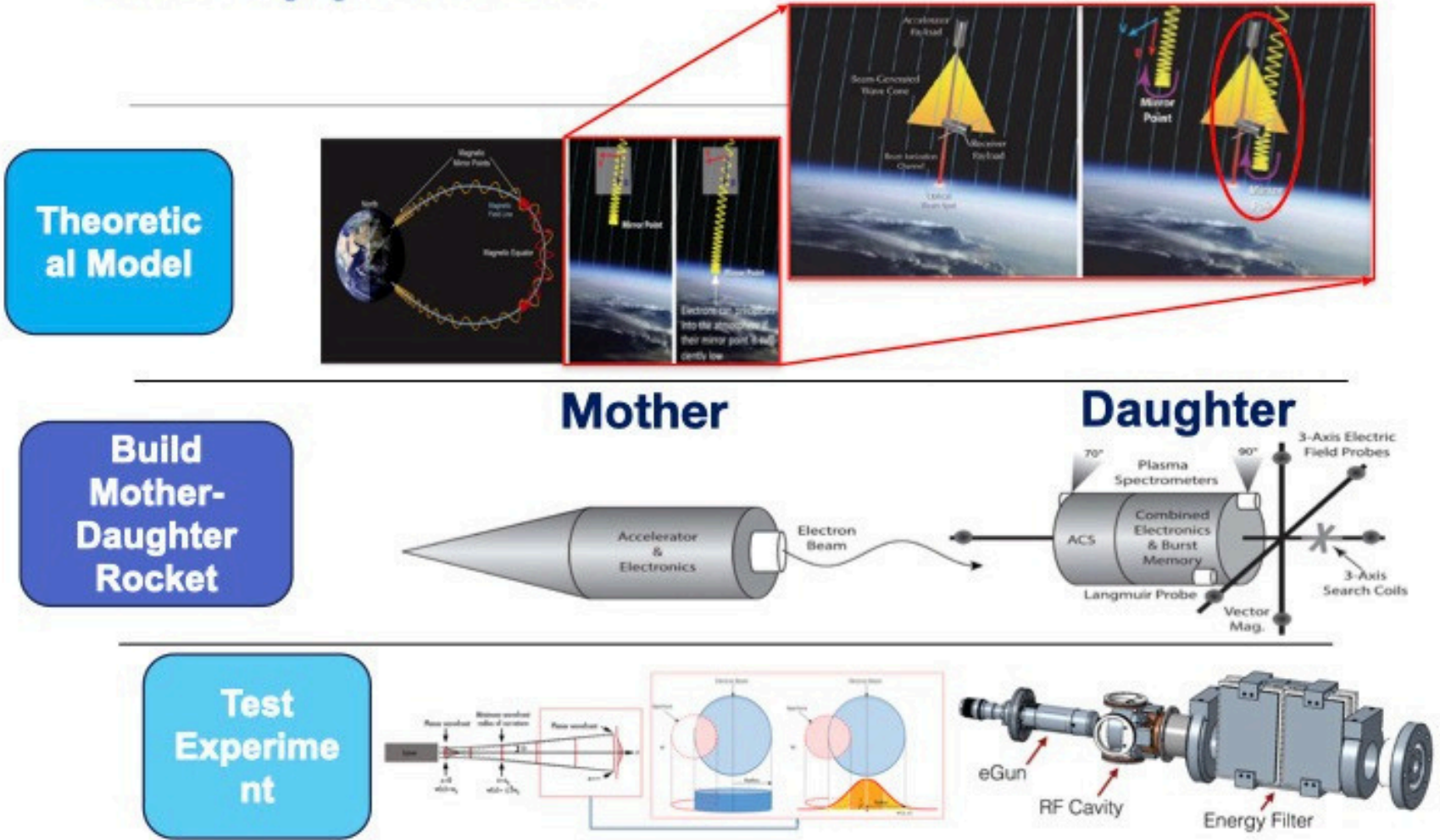
Waves generated by an artificial electron beam using a space accelerator in the beam plasma interaction experiment

### Radiation Belt Remediation due to High Altitude Nuclear Explosion (HAND)

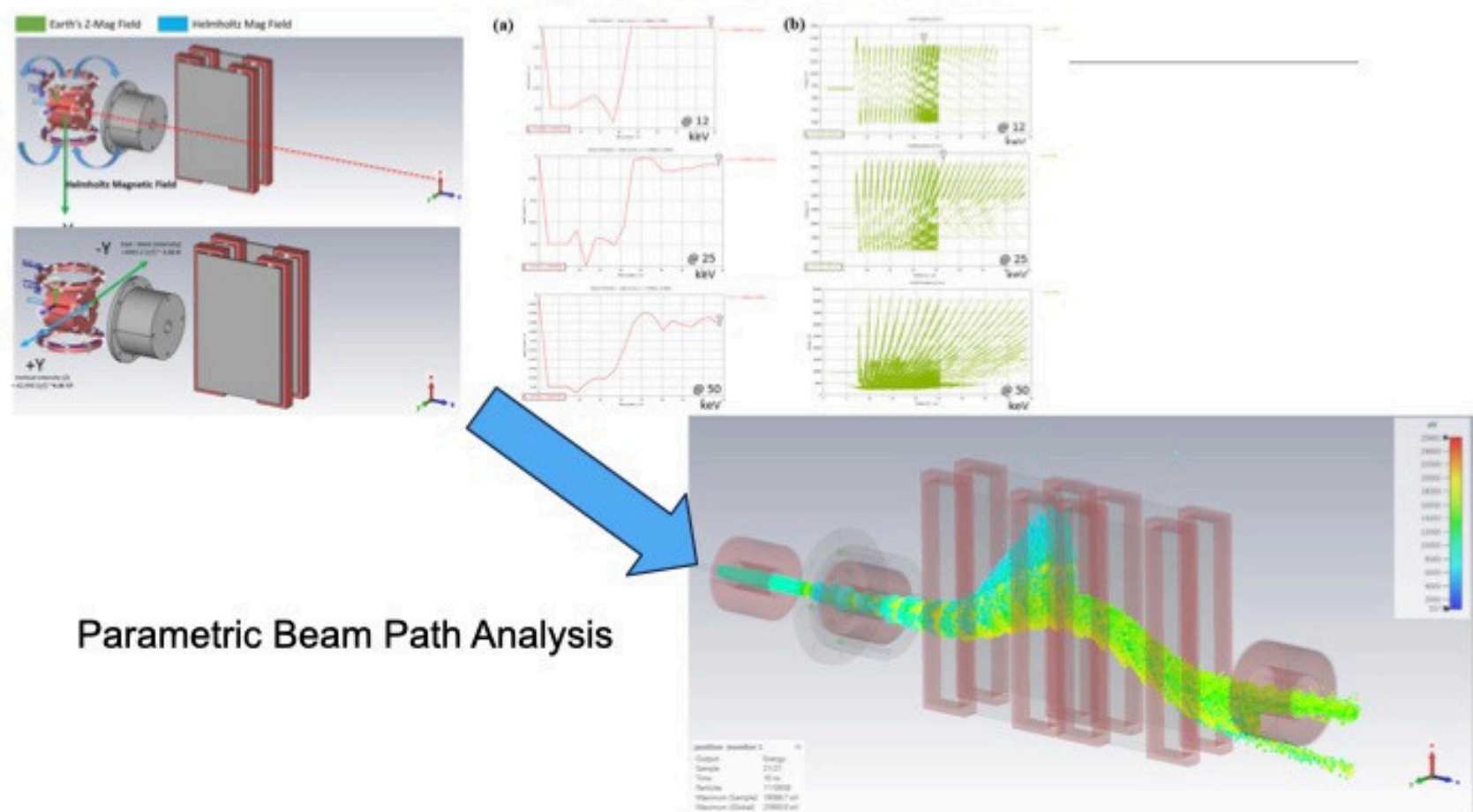


Satellites (even people) in Low Earth Orbit (LEO) Are Vulnerable To Enhanced Electron Flux In The Inner Radiation Belt

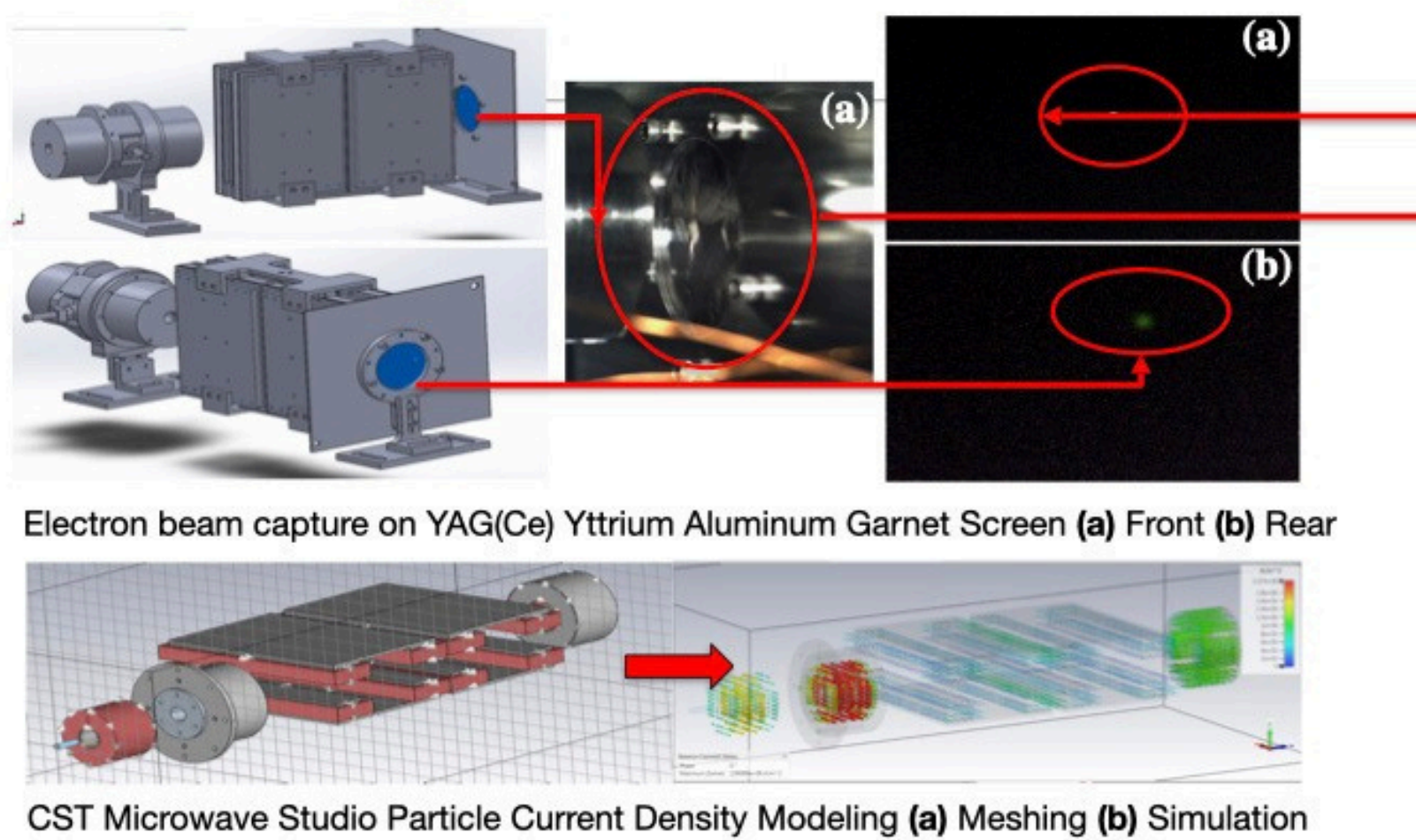
### The Approach



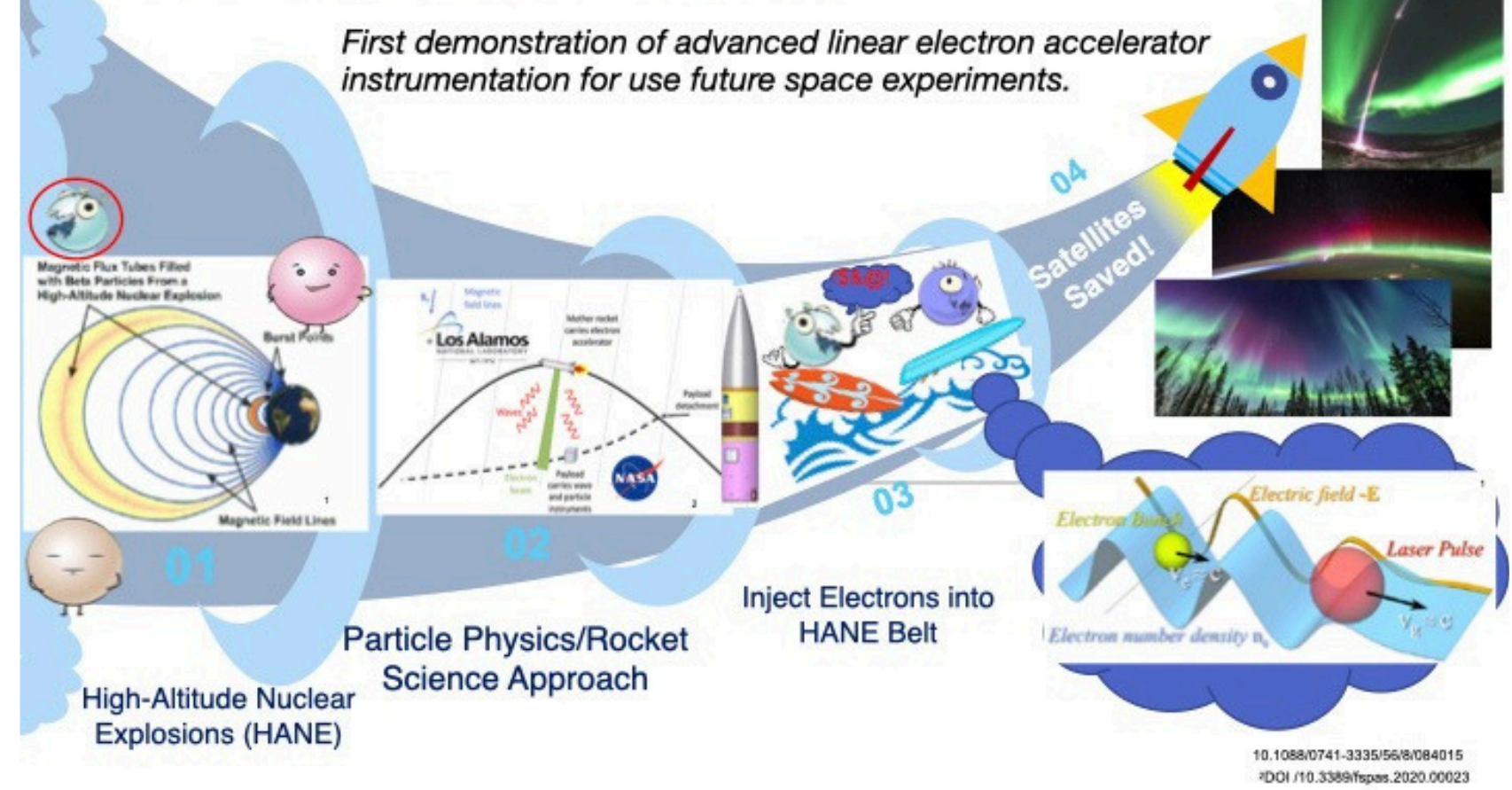
### Experiment and Theoretical Beam Physics Control



### Preliminary Results



### The Overall Vision



### References and Contributions

- [1] Reeves, Geoffrey D., et al. "The beam plasma interactions experiment: An active experiment using pulsed electron beams." *Frontiers in Astronomy and Space Sciences* 7 (2020): 23.
- [2] Reeves, Geoffrey D. "Wave Generation and Wave-Particle Interaction Using Space-Based, RF, Linear Electron Accelerators." 2021 USNC-URSI Radio Science Meeting (USNC-URSI RSM). IEEE, 2021.
- [3] Duffy, Leanne Delma, et al. "Beam dynamics modeling of the Beam Plasma Interaction Experiment." *AGU Fall Meeting Abstracts*, Vol. 2020. 2020.
- [4] Reeves, Geoffrey D., et al. "The Beam Plasma Interactions Experiment (Beam PIE): A sub-orbital active experiment." *AGU Fall Meeting 2019*. Agu, 2019.
- [5] Carlsten, Bruce E., et al. "Response to comment on "radiation-belt remediation using space-based antennas and electron beams" by G. Ganguli and C. Crabtree." *IEEE Transactions on Plasma Science* 48.2 (2020): 604-607.
- [6] Carlsten, Bruce. "Applications of Compact Accelerators in Space for National Security." (2018).



**ACKNOWLEDGMENTS: ADVISOR:** Dr. Feryal Özel **COLLABORATORS:** Dr. Geoff Reeves, Dr. Nicole Lloyd-Ronning, Dr. Gian-Luca Delzanno, Dr. Mike Holloway, Dr. Quinn Markstienner, Dr. Vitaly Pavlenko, and Los Alamos Space Weather Summer School **FINANCIAL CONTRIBUTIONS:** DOE NNSA LRGF Fellowship, SREB Fellowship, Ford Fellowship, GEM Fellowship, ACRS Foundation Award, and GFSD Fellowship **ARCS DONORS:** Mary Dodson and Dr. Rachel Burke

Scholar Awards Celebration  
November 15, 2023



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