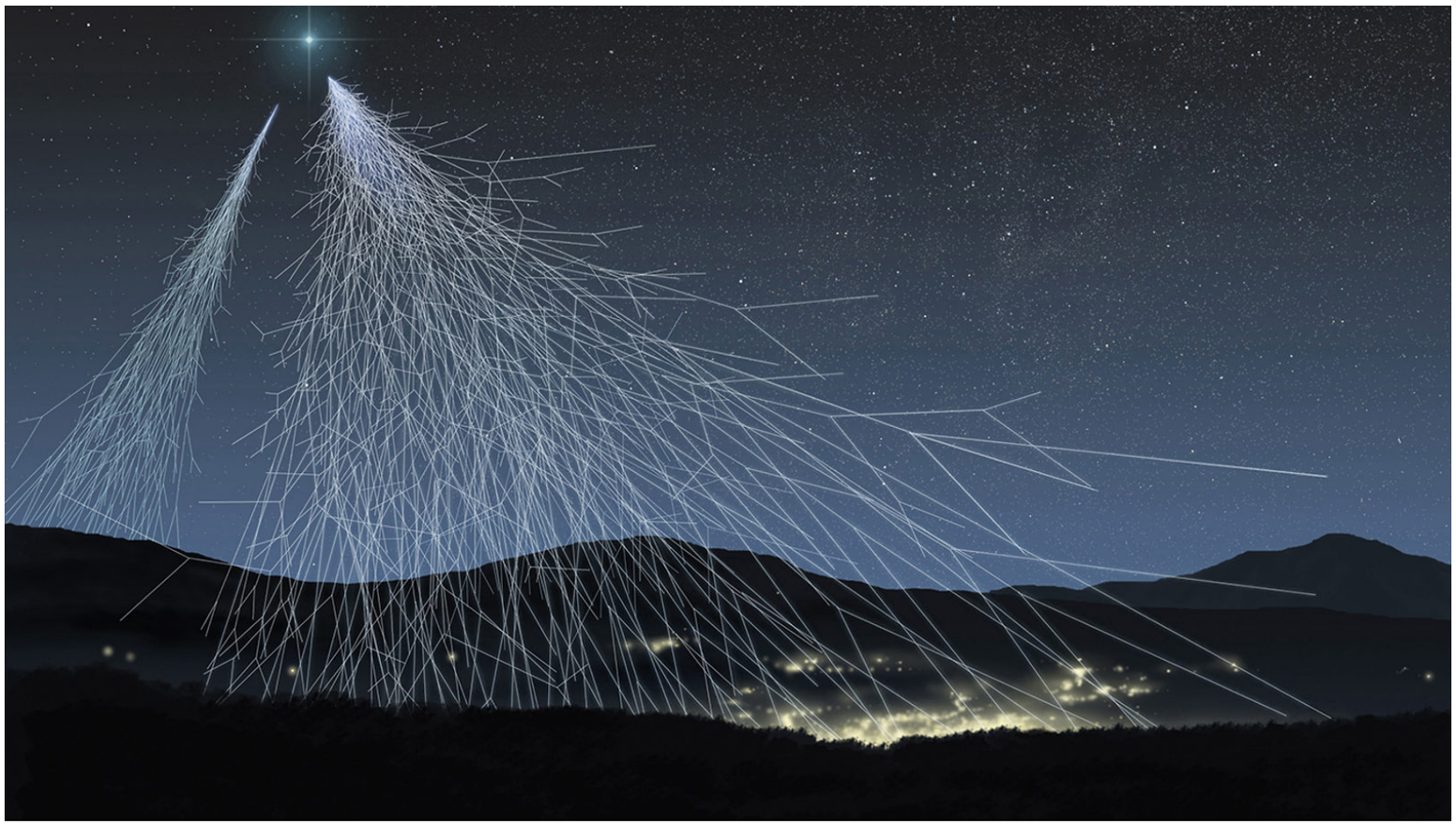


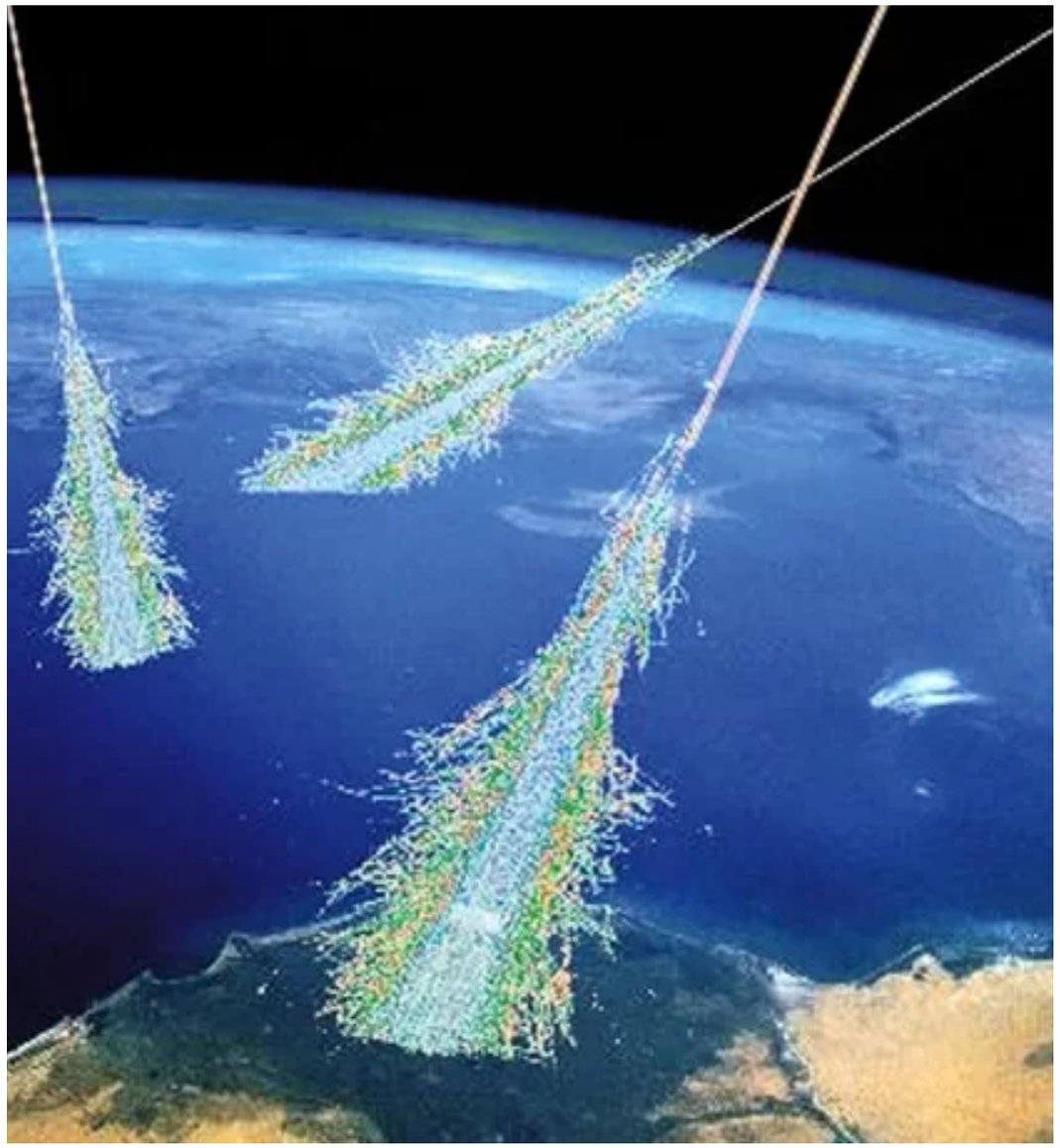
ASPERA/Novapix/L. Bret: Symmetry Magazine

CubeSat Cosmic Ray Observatory

Yale Undergraduate Aerospace Association (YUAA)

The goal

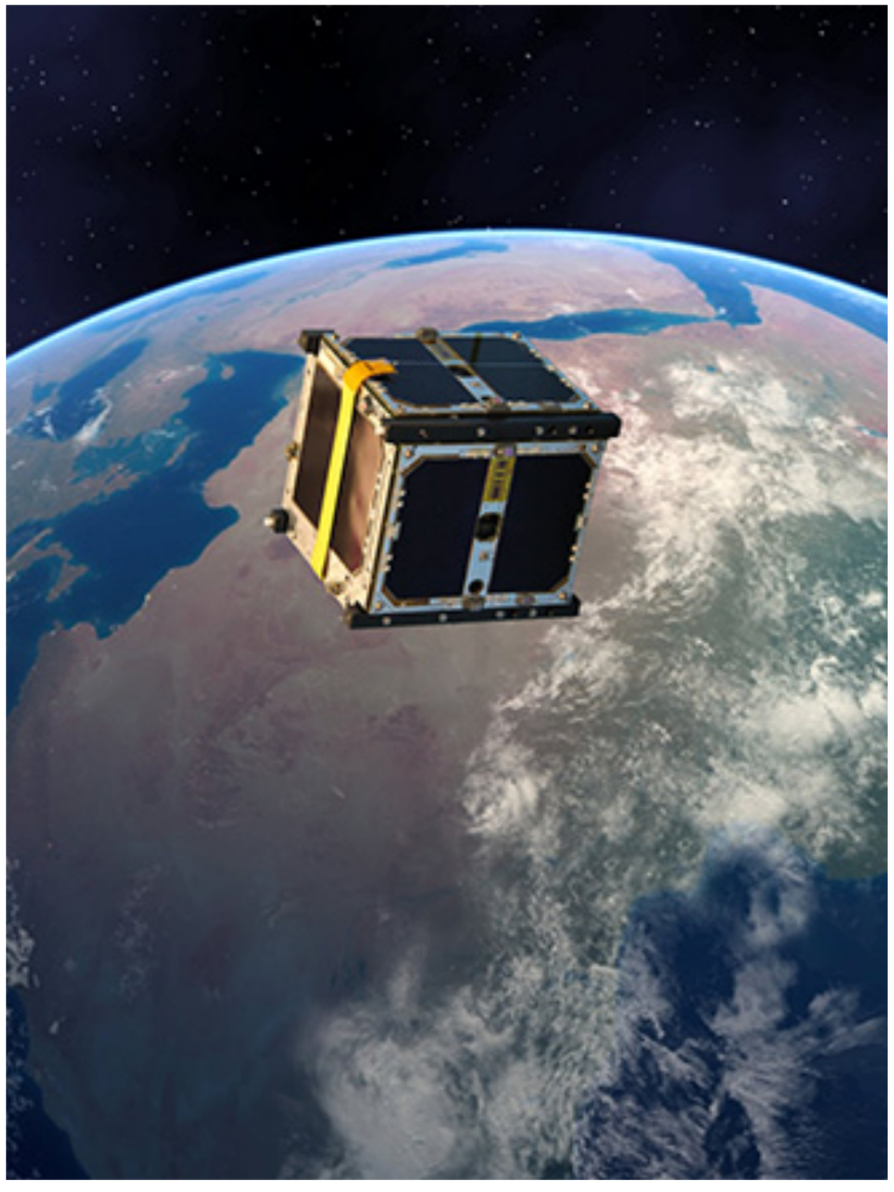
- Design and construct a cosmic ray detector for use in low-Earth orbit
- Assemble a functional satellite to carry this payload
- Secure a launch date from NASA
- Bring Yale into the space age



Simon Swordy (U.Chicago), NASA

CubeSat history

- Project began four years ago with an optical communications payload
- Organization has never launched a satellite into orbit, but many other universities have
- New frontier for Yale University

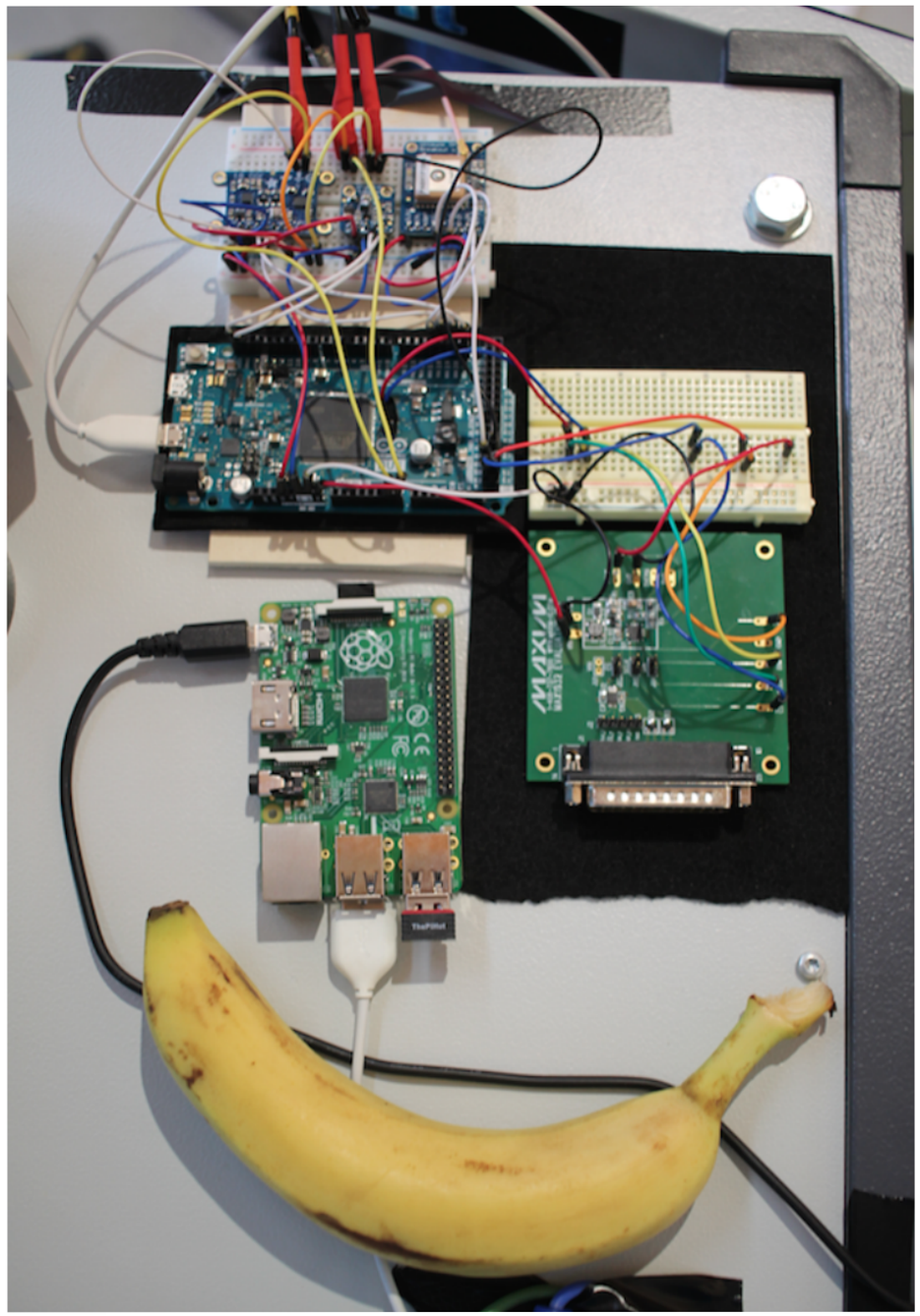


The satellite

- Dimensions: “2U,” or 20 cm × 10 cm × 10 cm
- Attitude determination/control – magnetorquer, sun sensor
- Radio system (antenna retracted at launch, extended in orbit by a nichrome burn wire)
- Develop our own software: *sensor drivers, PID control, data transmission*
- Cosmic ray detector

photo: Innovative Solutions in Space

Cosmic ray detector



- Planning to launch a layered scintillator-based cosmic ray detector in LEO
- Detector will yield information about particle coincidence, energy, and charge (Pulse shape discrimination techniques)
- Open source designs: CosmicPi project at CERN and the CosmicWatch team at MIT. Adapting these muon detectors to orbital conditions

Our team

- Undergraduates who are interested in aerospace engineering
- Many different majors, but typically in STEM fields
- While we've all been working on this project for a while, we very much understand the complexity of the task before us, and where we are inadequate

Where we get advice

- Partnership with Wright Lab
- Our advisor: Dr. Larry Wilen
- YUAA Technical Advisors Alex Hoganson (prior CubeSat experience) and Warren Zhang
- The rest of the world: NASA (published CubeSat guidance), CERN (e.g. adapting the CRD to LEO)
- And our fellow team members: past research, accumulated documentation library over the past 4 years. Practical expertise across other teams such as solar panel fabrication.

Where we work

- Looking to begin assembly work later this year
- In the future, will need to conduct environment tests (vacuum, vibration, etc.) at Wright Lab
- Primarily the CEID in Becton
- We are also excited about developing a second presence for CubeSat at Wright Lab, with cleanroom capabilities.

Thank you all for your time!