

# LIGHTSAIL-B MISSION OVERVIEW

Sean Chait

Dr. David Spencer

October 26, 2015

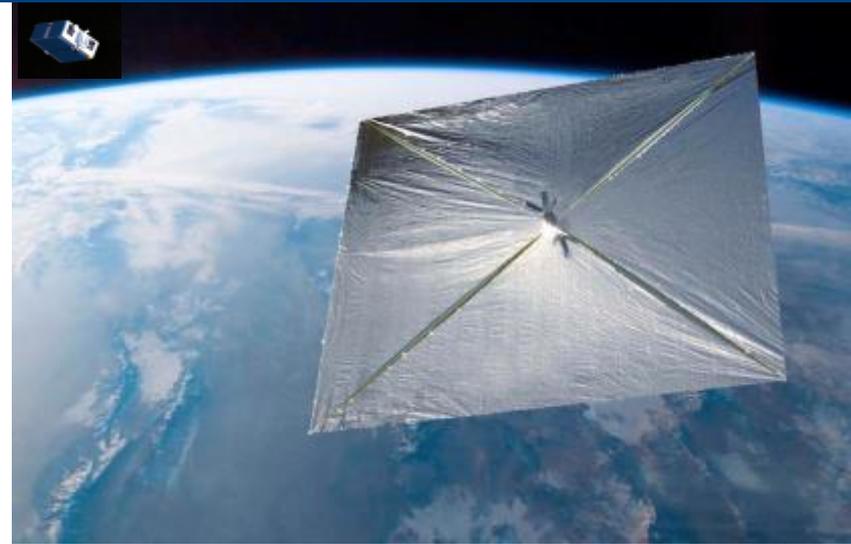
Space Systems Design Lab

Georgia Institute of Technology

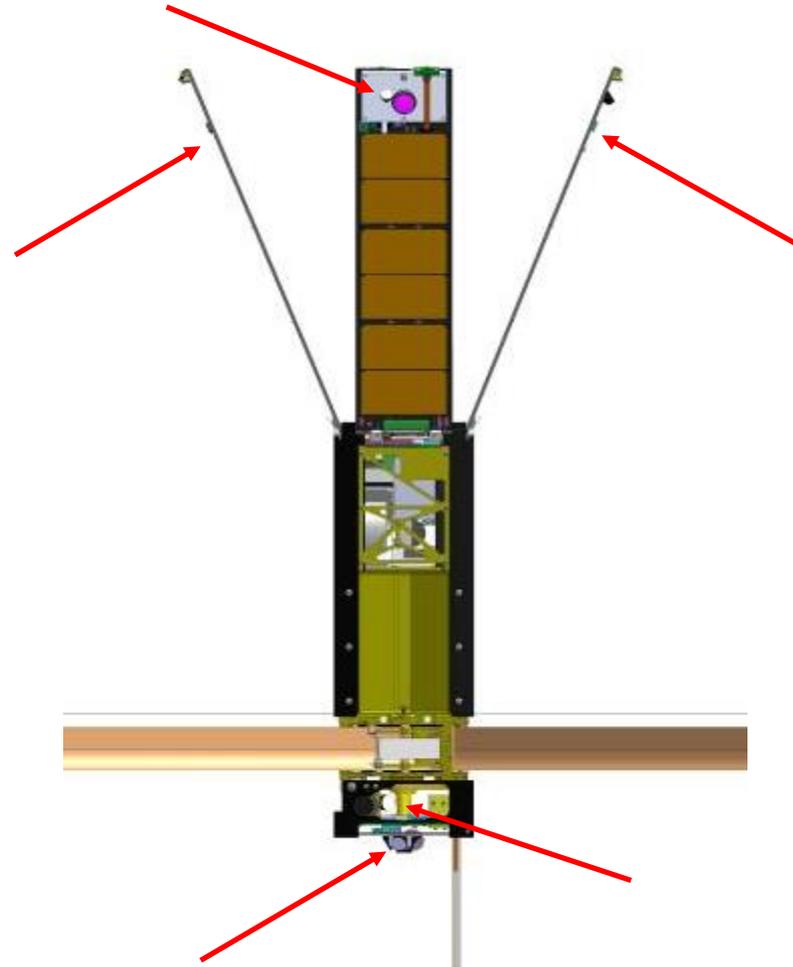
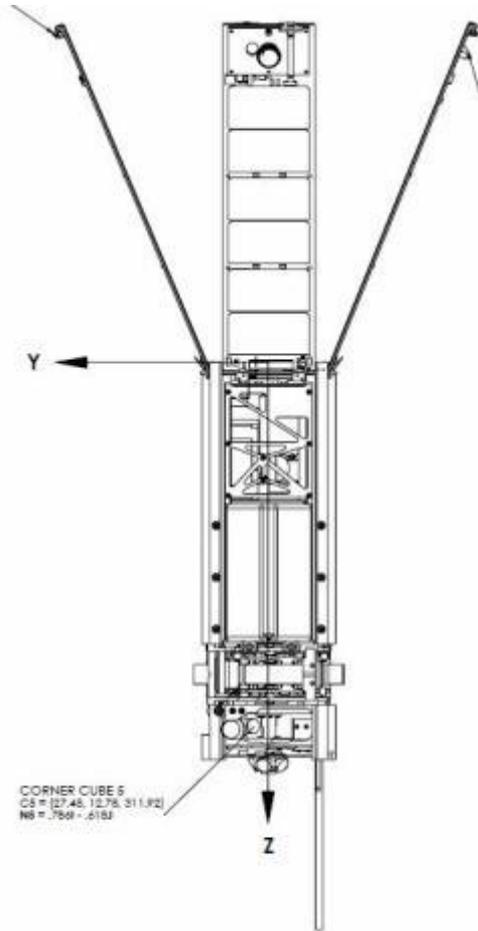


# LIGHTSAIL-B MISSION OVERVIEW

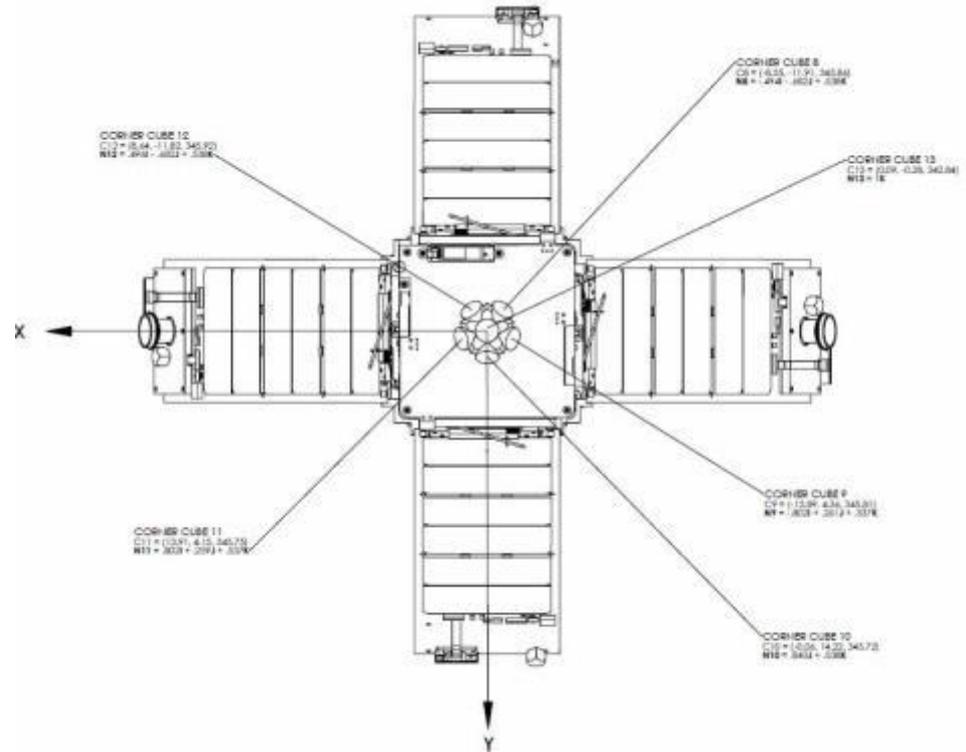
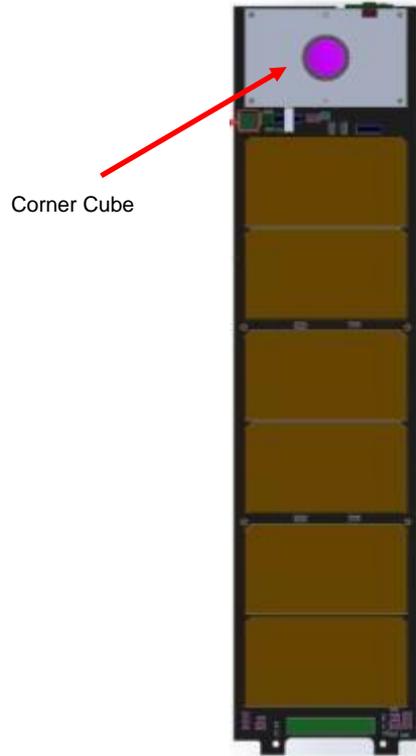
- LightSail-B Mission Objectives
  - Deploy 32 m<sup>2</sup> solar sail from 3U CubeSat
  - Demonstrate controlled orbit change using solar radiation pressure, increasing apogee
  - 30-day mission duration following sail deployment
- Planned launch date: Sept. 15, 2015
  - STP-2, SpaceX Falcon Heavy
  - Cape Canaveral AFS
  - Orbit: 720 km circular, 24° inclination
- LightSail-B will be deployed from the Prox-1 microsatellite
- Following spacecraft checkout and Prox-1 rendezvous, solar panel and solar sail deployment will be initiated via ground commands
- Sail orientation is controlled using torque rods and a single-axis momentum wheel
- Expected apogee rate of change: 700 m/day during first two weeks
- Possible extended mission: ground-based laser propulsion demonstration
- 13 total corner cubes for laser ranging, both solar panel and body mounted



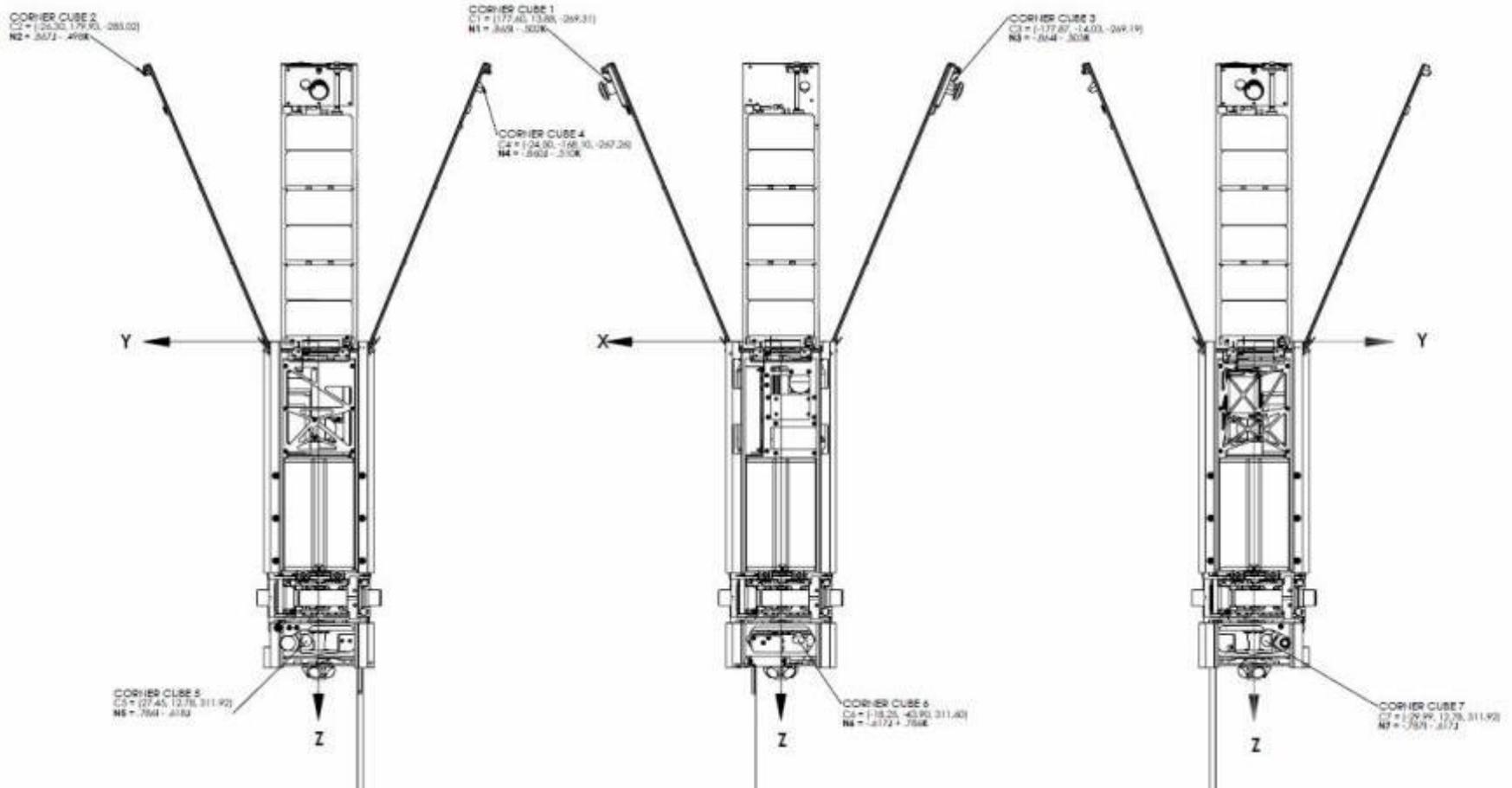
# LS-B HARDWARE OVERVIEW (1 OF 3)



# LS-B HARDWARE OVERVIEW (2 OF 3)



# LS-B HARDWARE OVERVIEW (3 OF 3)



# LESSONS LEARNED FROM LIGHTSAIL-A

- LightSail-A was in a highly elliptical orbit (350 by 700 km), low altitude resulting in a short orbital lifetime after sail deployment ( < 2 weeks)
  - Meant as a spacecraft and sail deployment demo
  - LightSail-B will be in a much higher orbit ( 720 km circular ) with re-entry predicted after 6 – 12 months
- Attitude Control/Orbit Prediction Issues
  - Software failure resulted in no attitude control of LightSail-A
  - Low altitude and lack of attitude control resulted in rapid orbit degradation and inability to precisely predict orbit decay
  - LightSail-B is undergoing a far more rigorous test program and its high altitude results in slower orbit decay even in event of ACS failure
  - Working with NASA Marshall Space Flight Center to increase reliability of orbit prediction methods
- Increase in number of corner cube reflector arrays
  - Six additional corner cubes added to LightSail-B to increase visibility to laser ranging stations

