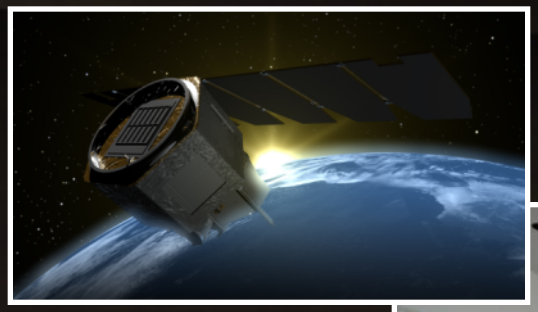
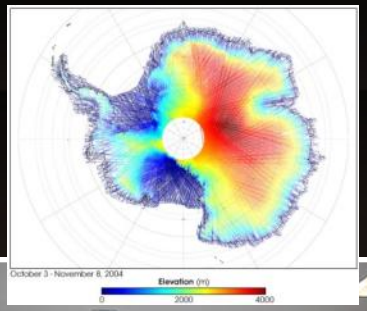
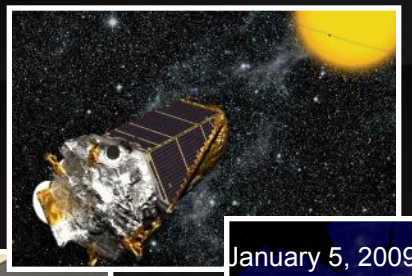
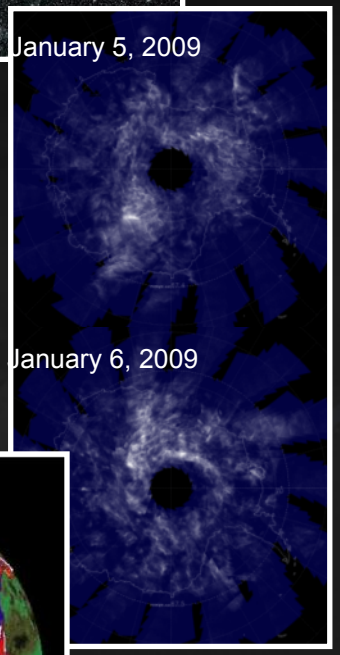
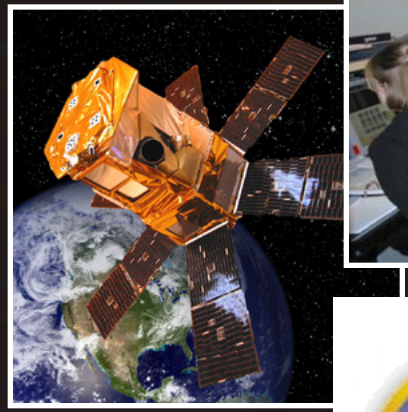
LASP Mission Operations



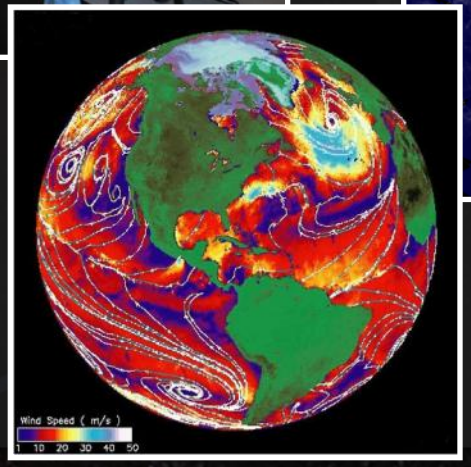






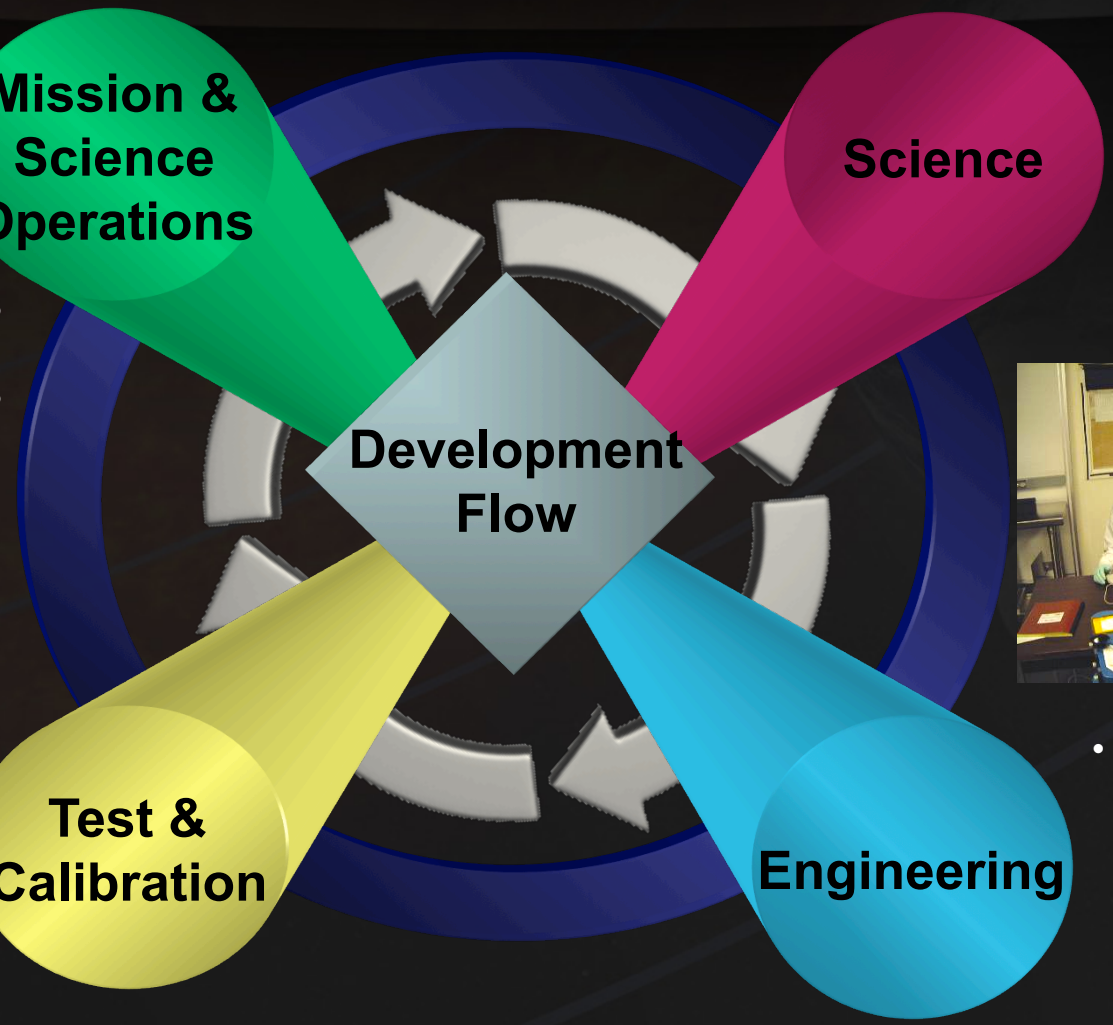


SeaWinds ON QUIKSCAT



Unique Synergism within LASP

Student Involvement Throughout



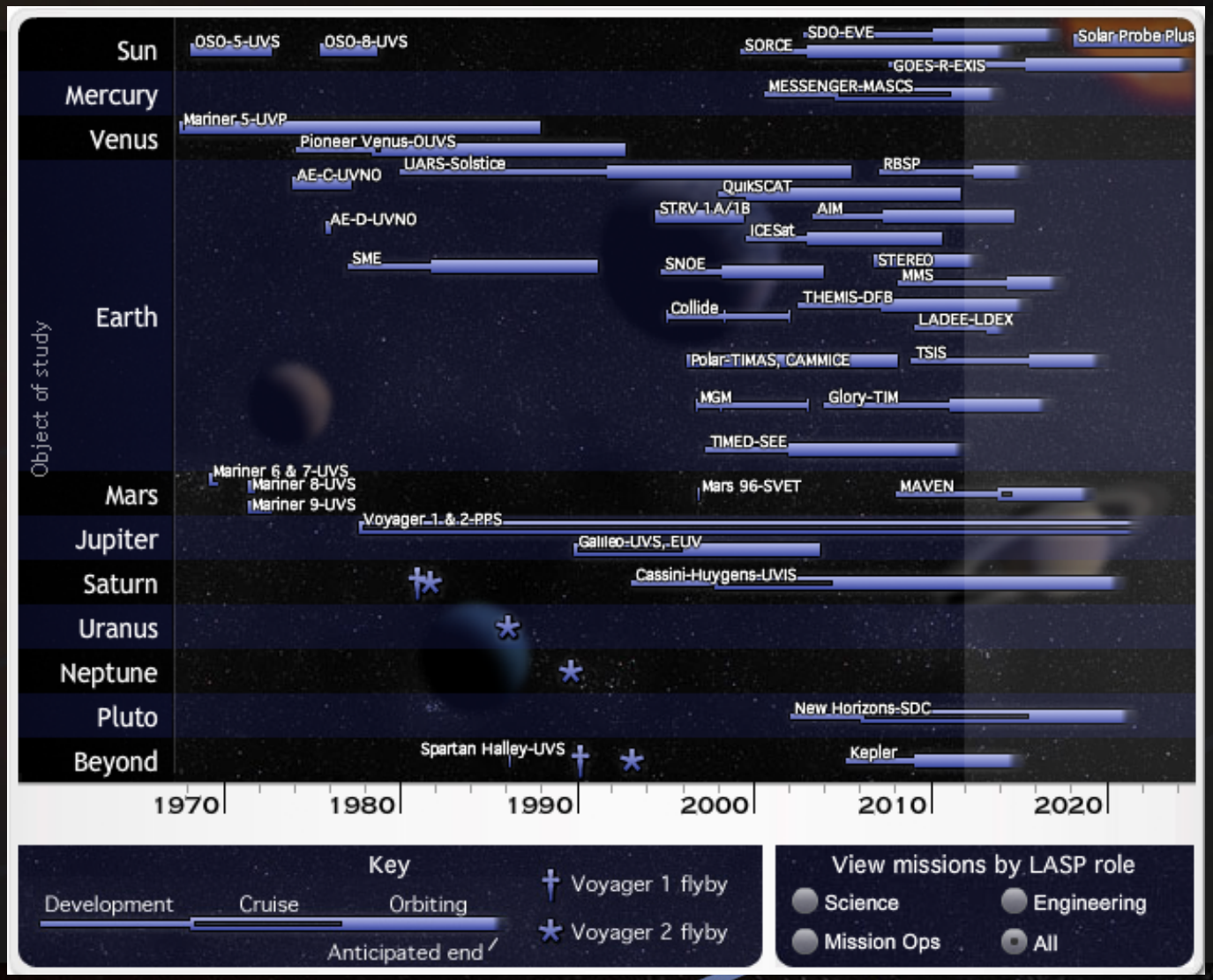
- Spacecraft Operations
- Payload Operations
- Science Data Analysis
- Mission Scheduling

- In-House Facilities

- Identify/Address Space Science Questions
  - Planetary
  - Atmospheric
  - Solar
  - Space Physics

- Design, build, test space system hardware

LASP Space Mission Participation



LASP has now sent instruments to every planet in the solar system and beyond (Voyager)

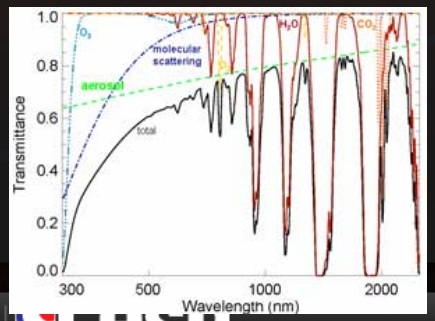
Data as of April 2013

Mission Operations & Data Systems

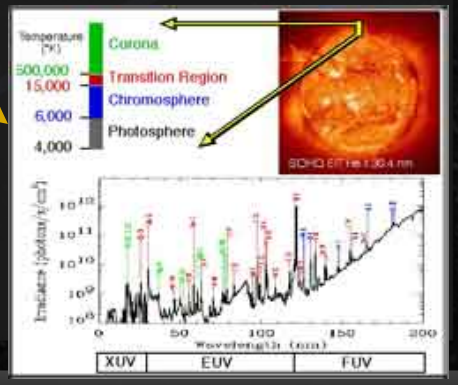
Develop & Test
New Systems

Operate Spacecraft &
Payloads

Integrated Professional &
Student Operators



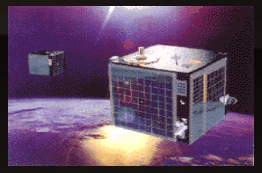
Process & Distribute
Data to LASP Scientific
Community and Beyond



30+ years of LASP Mission Ops

Past & Current Spacecraft/Instruments Operated by LASP

SME (1981-1989)

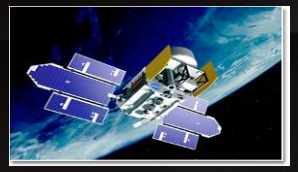


STRV-1A & STRV-1B (1996-1998)

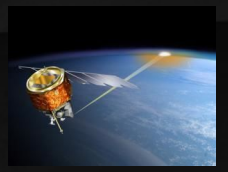
SNOE (1998-2004)

QuikSCAT (1999-present)

SORCE (2003-present)



ICESat (2003-2010)



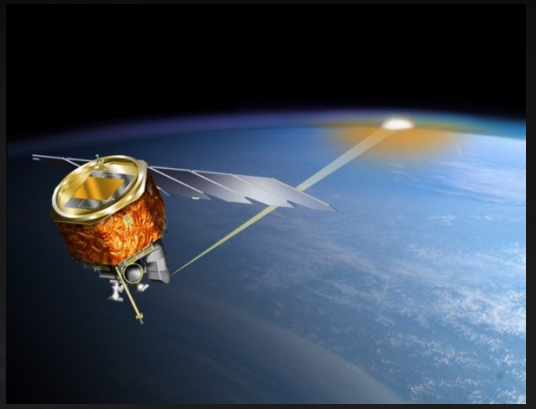
AIM (2007 - present)

Kepler (2009 - present)

	Built S/C	Built Instr	Mission Ops	Instr Ops
SME		✓	✓	✓
STRV-1A & 1B			✓	
SNOE	✓	✓	✓	✓
QuikSCAT			✓	
SORCE		✓	✓	✓
ICESat			✓	
AIM		✓	✓	✓
Kepler			✓	

Current Mission & Science Operations

- **4 Satellites**: QuikSCAT, *ICESat*, SORCE, AIM, Kepler
  - **SORCE**: Mission to study solar irradiance
  - **QuikSCAT**: Study ocean's surface winds
  - **ICESat**: Study ice sheet mass (De-orbited)
  - **AIM**: Study polar mesospheric clouds
  - **Kepler**: Search for Earth size planets

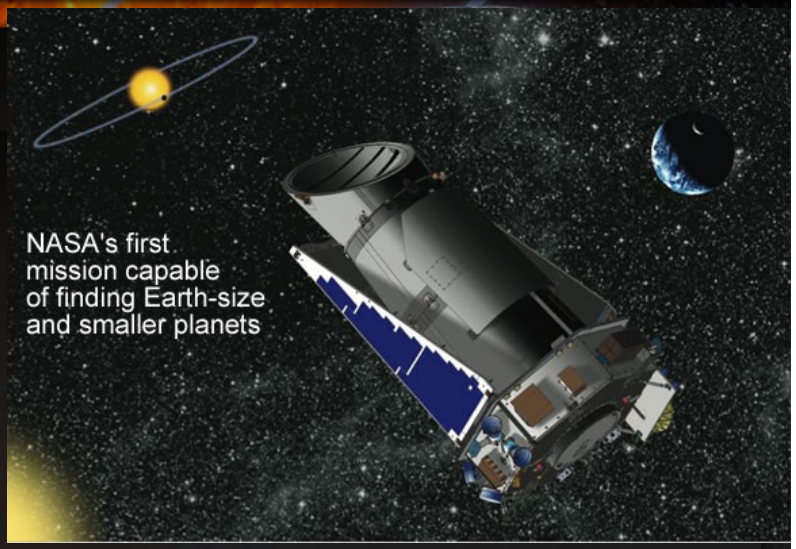


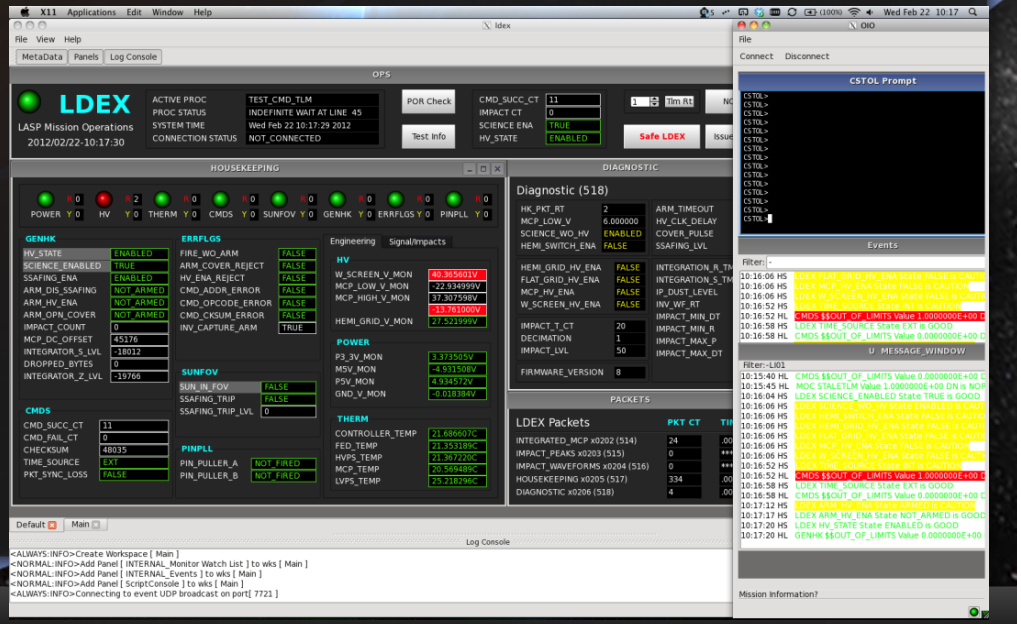
- **12 Instruments on 8 different satellites including**:
  - Solar Dynamics Observatory/EVE
  - Cassini UVIS: Study Saturn's atmosphere, rings, & moons
  - MESSENGER MASCS: Study Mercury's atmosphere & surface
  - New Horizons SDC: Study interplanetary dust (Pluto)

Over $1B of space systems controlled from LASP

Operations Software

- In-house developed software
- Tailored for mission specific needs
- Four categories
  - Command and Control
  - Telemetry Data Processing
  - Engineering Analysis
  - Quality and Status Monitoring

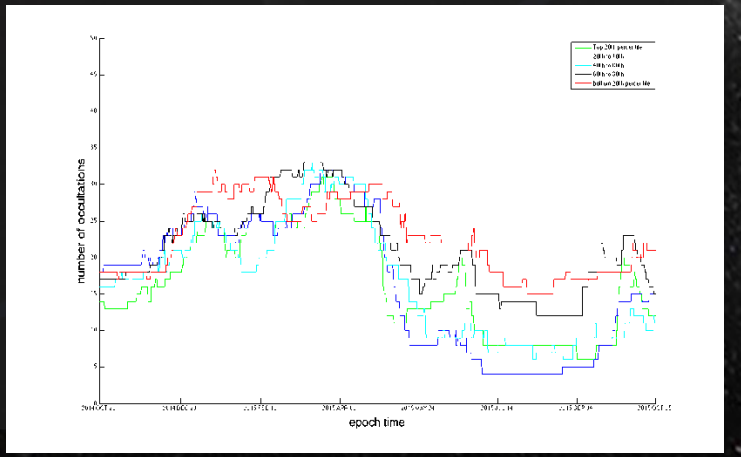




LASP

Planning and Scheduling

- Important part of mission operations is ensuring that the instruments take the right scientific data at the right time
- Planning & Scheduling team functions as each instrument's time-management assistant
- Software product, developed here at LASP, is called Operations and Science Instrument Support Planning and Scheduling system (OASIS-PS)



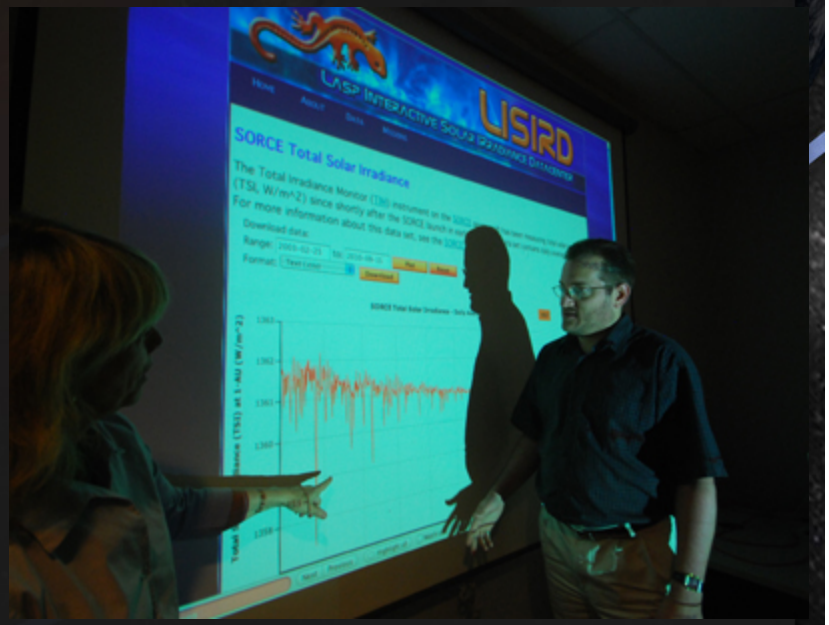
Data Systems

Software engineers and data analysts serve as the interface between software and science

- Scientists around the world then use our data products

Maintains expertise in:

- numerical analysis,
- algorithms, programming techniques and methodologies,
- data management and analysis,
- data system design



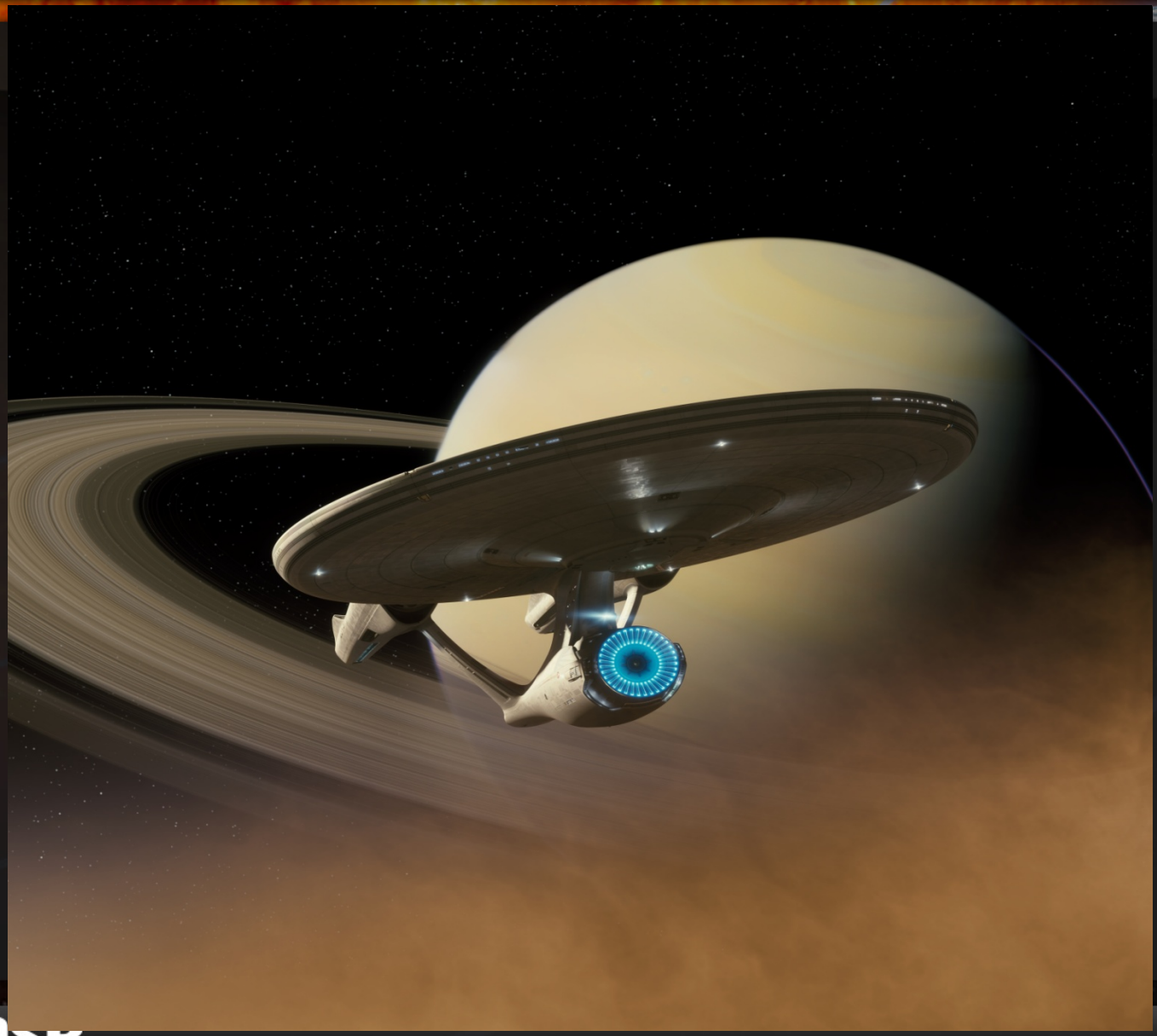
Training the Next Generation Workforce

- Students gain experience as productive members of mission teams, including skills important for partnering with space industries:
  - Hands-on experience in designing, building, testing, and operating space flight hardware
  - Working as a member of a team
  - Maintaining high quality under tight deadlines

How Can We Help You?

- Well established, low cost space system operations
- State-of-the-art software for operations, planning & scheduling, data processing & data analysis
- Next Generation Workforce

LASP's Next Mission with You?



Laboratory for Atmospheric and Space Physics
University of Colorado **Boulder**

Thank you for your attention.
While at the National Space Symposium please contact Thomas Sparn (303) 591-1861 if you have further questions.

Contact LASP

- 1234 Innovation Drive, Boulder, CO 80303
- 303-492-6412
- http://lasp.colorado.edu
- info@lasp.colorado.edu