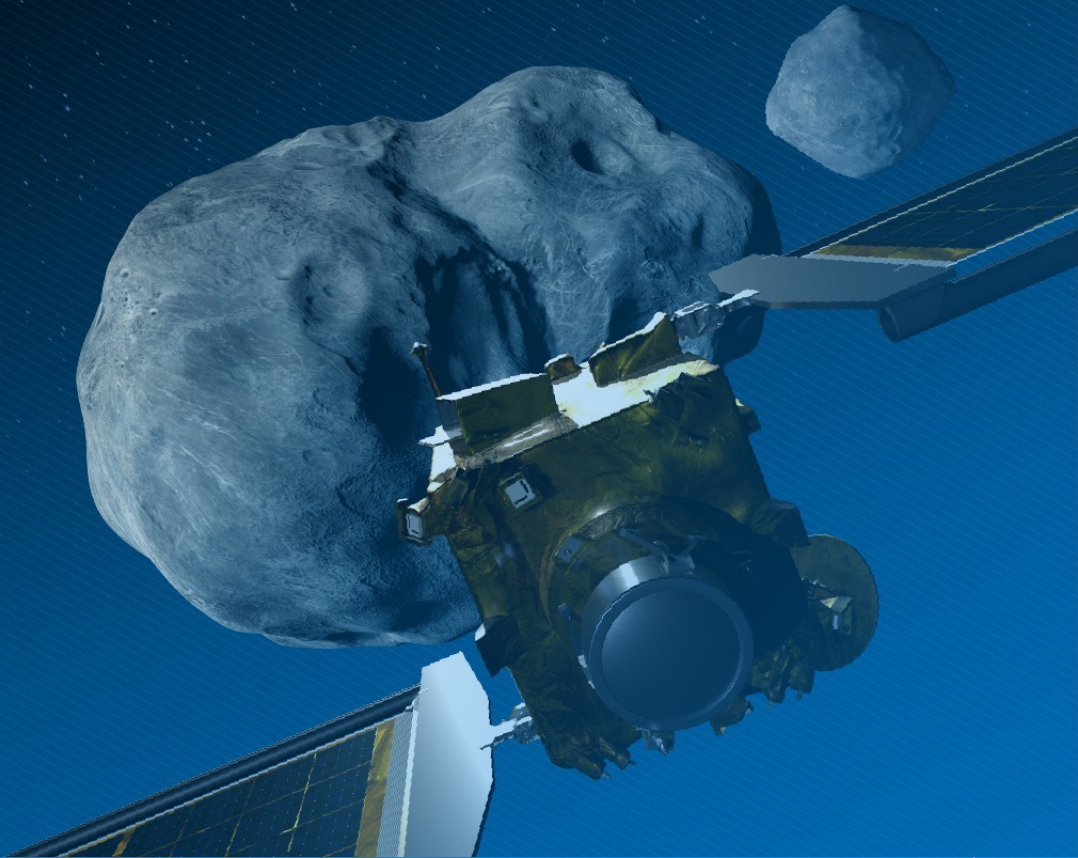


# Double Asteroid Redirect Test (DART) Mission Status

Dr. Elena Adams  
Elena.Adams@jhuapl.edu  
26 April, 2021



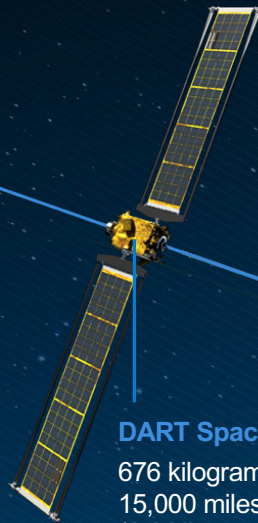
# Launch

November 18, 2021 – February 15, 2022

- Target the binary asteroid Didymos system
- Impact Dimorphos and change its orbital period
- Measure the period change from Earth

September 25 -  
October 1, 2022

**LICIACube**  
(Light Italian Cubesat  
for Imaging of  
Asteroids)  
ASI contribution



**DART Spacecraft**  
676 kilograms wet mass  
15,000 miles per hour  
(6.6 kilometers per second)

**Dimorphos**  
160 meters  
11.92-hour orbital period

1,180-meter separation  
between centers

**Didymos**  
780 meters  
2.26-hour rotation period

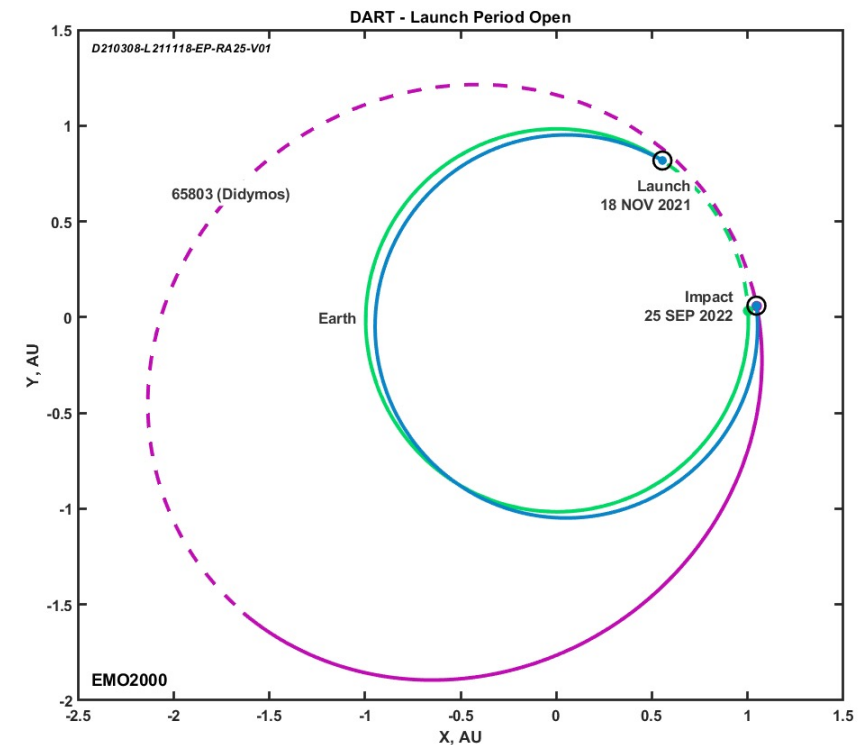


**Earth-Based Observations**  
7.1 million miles (~0.07 AU) from  
Earth at DART impact



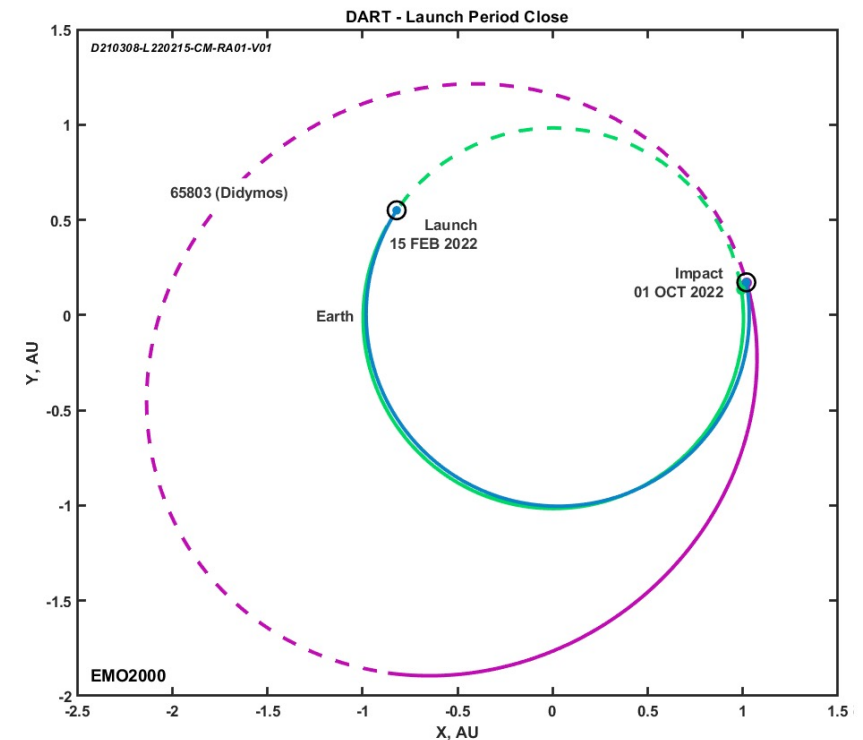
# DART moves to the secondary launch opportunity

- DART was directed by NASA to move to secondary launch opportunity with baseline **launch readiness date: 18 November, 2021**
- This secondary opportunity allows DART to meet its launch and objectives
  - Launch ground coverage becomes simpler, as DART will have a good contact with ESTRACK's New Norcia ground station
  - Cruise portion of the mission is a few months shorter
  - Impact geometry and velocity is comparable
  - Spacecraft still arrives at Dimorphos near the asteroid's closest approach to Earth, and guarantees good ground telescope and radar coverage
    - New impact dates: 25 Sept, 2022- 01 Oct, 2022



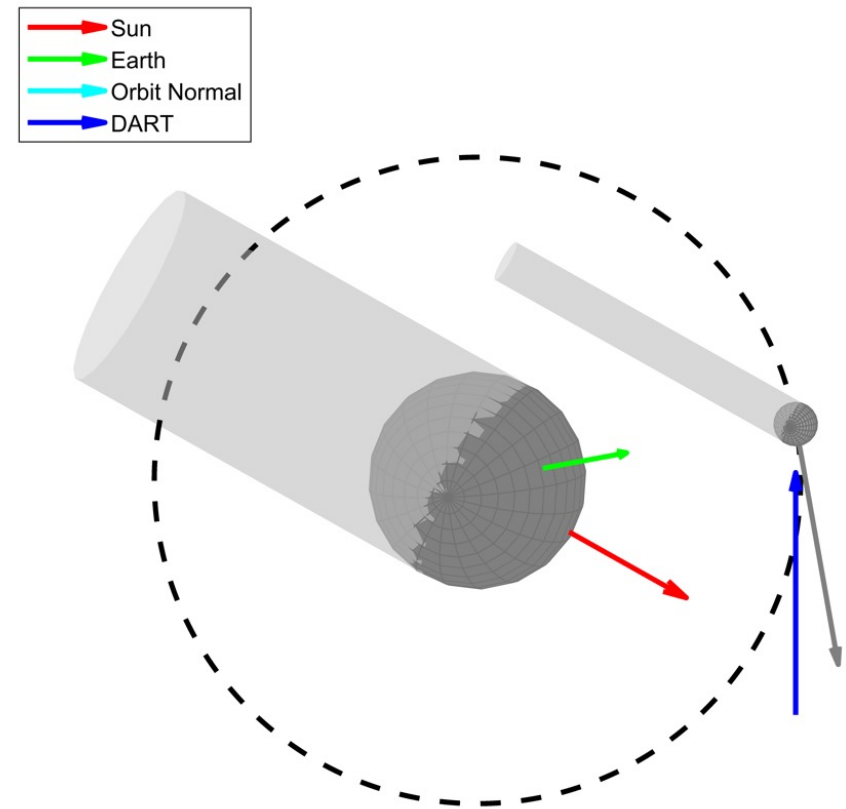
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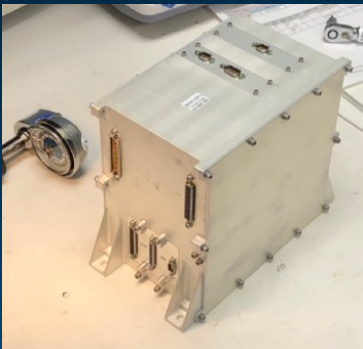


# DART: Key and New Technologies

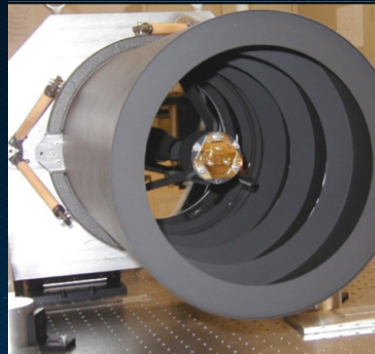
DART will mature key new technologies for future planetary missions



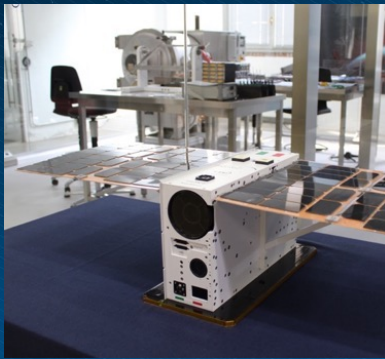
Autonomous Navigation  
using SMART Nav



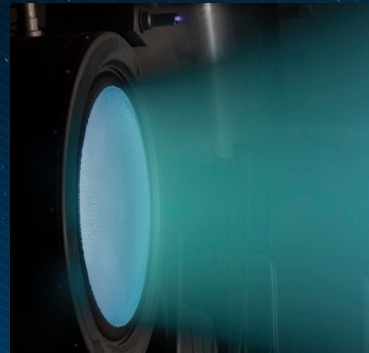
Coresat Avionics



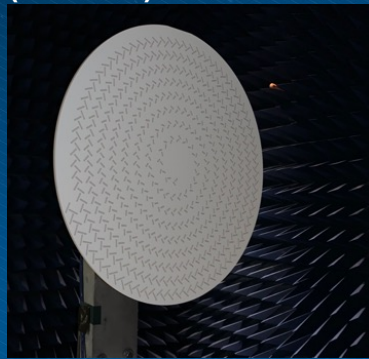
DRACO Telescope



LICIACube Cubesat



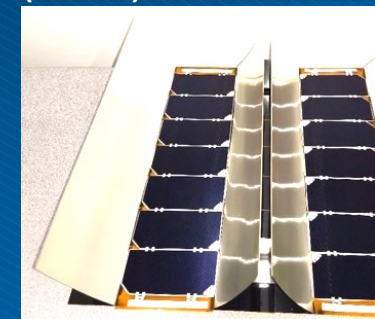
Ion Propulsion Engine  
(NEXT-C)



Radio Line Slot Array



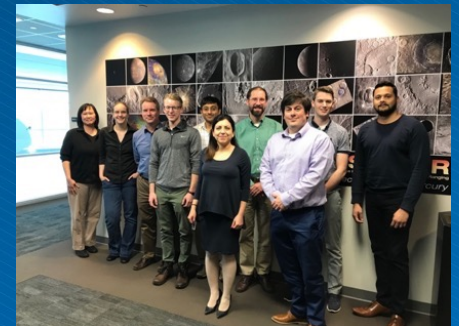
Roll Out Solar Arrays  
(ROSA)



Transformational Solar  
Array Concentrators

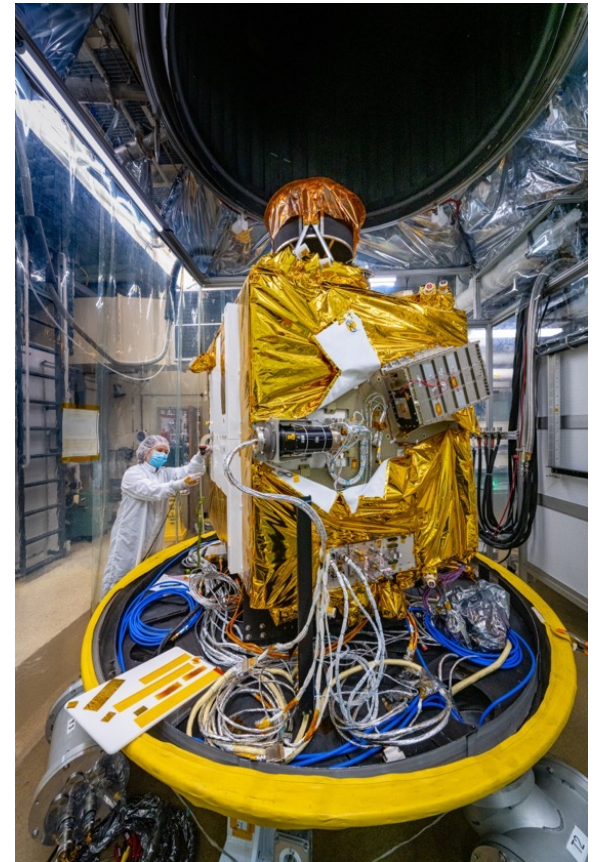


# Integrating and Testing Spacecraft Getting Ready for Launch This Year



# DART mission status overview

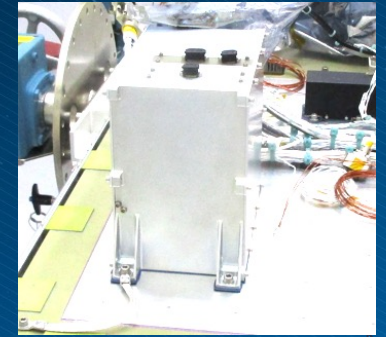
- Spacecraft integration and test is proceeding, even in COVID-19 environment



DART in thermal chamber



# Timeline to Launch



Integration  
Readiness  
Review ✓

March 2020

NEXT-C  
Delivered ✓

April 2020

Panels/Harness  
Delivered,  
I&T began! ✓

April 2020

Spacecraft  
Core  
Delivered ✓

May 2020

Coresat Avionics  
Delivered and  
Integrated ✓

June 2020



# Timeline to Launch



**Solar Arrays  
Engineering  
Unit Deployed**  
(@ DSS) ✓  
Jul 2020

**Comprehensive  
Performance  
Test (CPT) 1** ✓  
Aug 2020

**Mission  
Simulation  
(MSIM) 1** ✓  
Aug 2020

**Closed  
S/C  
Panels** ✓  
Sept 2020

**DSN  
Compat  
Testing** ✓  
Oct 2020

**NEXT-C  
Integration** ✓  
Oct 2020

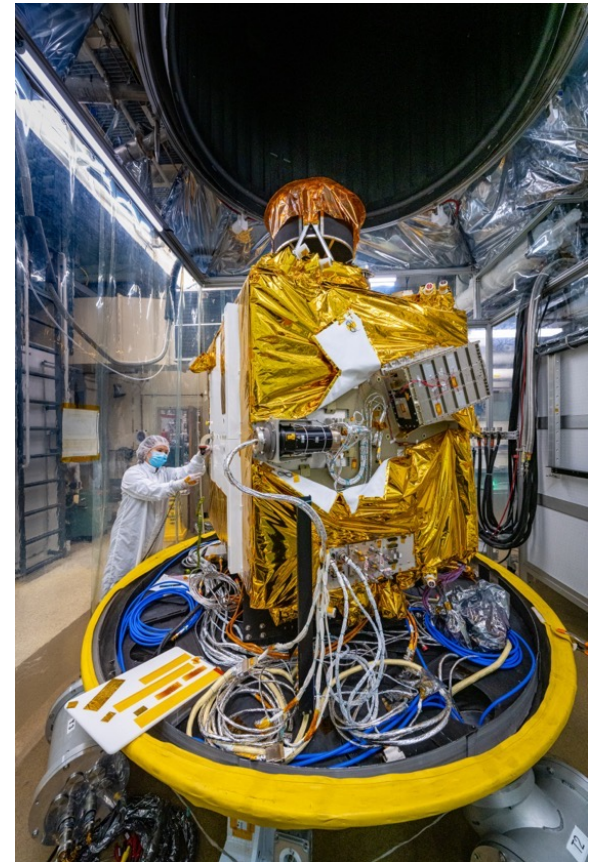
**CPT 2  
MSIM 2** ✓  
Dec 2020

**PER** ✓  
Jan 2021



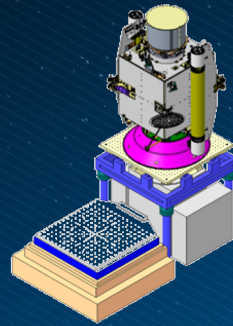
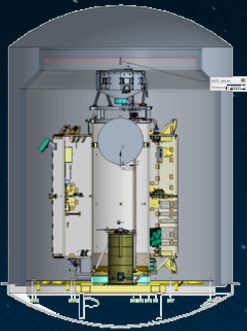
## DART mission status overview

- **Spacecraft integration and test is proceeding, even in COVID-19 environment**
- Move to the secondary launch opportunity is caused by waiting on two hardware articles to be delivered to the spacecraft: the DRACO telescope and the Solar Arrays
  - Spacecraft structural testing cannot commence without them
- DRACO telescope had a mirror failure during vibration of a spare flight telescope, and the failure investigation board concluded that the flight telescope mirror mounts needed redesign to ensure that the flight telescope survives spacecraft testing and launch. Redesign was completed, and new mirror mounts manufactured. **Telescope is expected to arrive for integration in June 2021**
- **Rollout Solar Arrays (ROSA)** have experienced delays in the build due to COVID and as part of the new technology development, but now **have been received at APL for integration on the spacecraft in May 2021**



DART in thermal chamber

# Timeline to Launch



Thermal **✓**  
Tests  
(CPT3, MSIM3)

Feb-Mar 2021

Solar Array **✓**  
Delivery

Apr 2021

DRACO  
telescope  
Delivery

Jun 2021

Structural  
Tests  
(Vibe,  
Shock)

July 2021

Pre-Ship  
Review

Sept 2021

Ship to  
Vandenberg  
Air Force Base

Oct 2021

Launch!

Nov 2021





# DART

Double Asteroid Redirection Test

