B612 FOUNDATION

Presents: SENTINEL

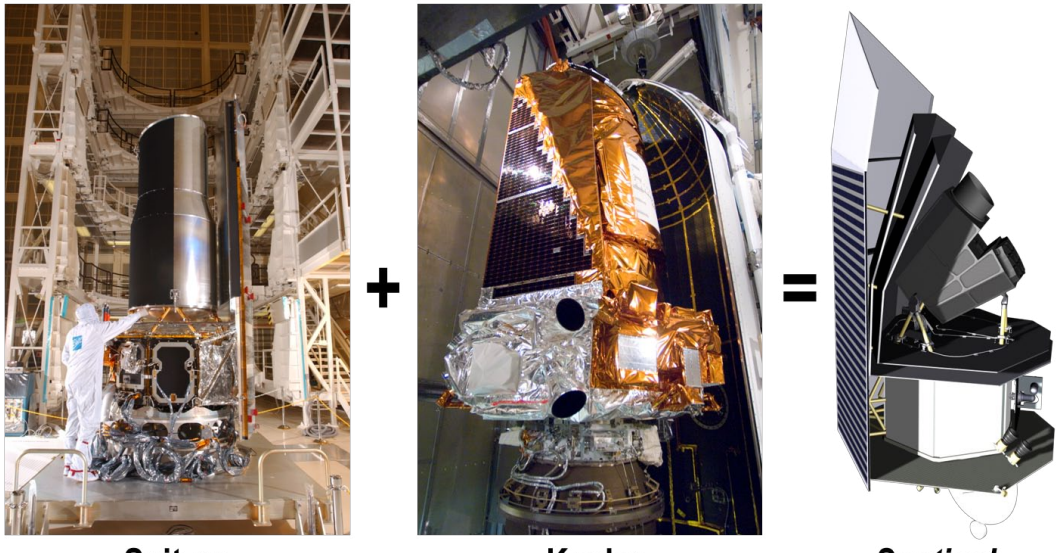
Sentinel is a space-based infrared (IR) survey mission to discover and catalog 90 percent of the asteroids larger than 140 meters in Earth's region of the solar system. The mission should also discover a significant number of smaller asteroids down to a diameter of 30 meters. Sentinel will be launched into a Venus-like orbit about the sun which significantly improves the efficiency of asteroid discovery during its 6.5 year mission. The spacecraft and instrument use high-heritage flight proven deep space systems, originally developed by NASA, to minimize technical and programmatic risks. These heritage missions include large space based telescopes (Spitzer, Kepler), a large format camera made up of many individual detectors (Kepler), and a cryogenically cooled instrument (Spitzer). By detecting and tracking nearly all of the Near Earth Objects greater than 50 meters in diameter, Sentinel will create a map of the solar system in Earth's neighborhood enabling future robotic and manned exploration. The Sentinel data will also identify objects that are potentially hazardous to humans to provide an early warning to protect the Earth from impact.

Features

- Most capable NEO detection system in operation
- 200 deg anti-sun Field of Regard, with a 2x5.5 deg Field of View at any point in time: scans ~165 square degrees per hour looking for moving objects
- Precise pointing accuracy to sub-pixel resolution for imaging revisit, using the detector fine steering capability
- Designed for highly autonomous, reliable operation requiring only weekly ground contact
- Designed for 6.5 years of surveying operations. Actively cooled to 40K using a Ball Aerospace two-stage, closed-cycle, Stirling-cycle cryocooler
- Ability to follow-up on objects of interest

Benefits

- Provides highly specialized design specifically optimized for NEO detection and discovery
- NEO detection efficiency increased using IR-detector (5 to 10.2 microns), Venus-like orbit
- Provides an astrometric accuracy of 0.2-arcseconds for any detected NEOs (typical); NEO orbits determined in as few as two detections, with multiple visits to each region of the sky
- On-board detection processing reduces data downlink volume, minimizes contact requirements
- Provides a targeted follow-up observation capability, enabling time-critical revisit of high priority targets
- Heritage draws lineage from great observatories and pioneering scientific missions: Kepler, Spitzer, Deep Impact



Spitzer Kepler *Sentinel*

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Sentinel

Specifications and Salient Features

Launch Information	2017-2018 with multiple opportunities Launch Vehicle: Falcon 9 Direct ascent into interplanetary trajectory
Orbit	0.6 by 0.8 AU Venus-like elliptical orbit
Mission Life	6.5 years Design and consumables support multi-year mission extension
Spacecraft Size, Mass and Power	7.7 m (25.4 ft) tall x 3.2 m (10.5 ft) across 1,500 kg (3,300 lbs) 2.0 kW solar array, 24 Ahr battery
Instrument	50 cm telescope 5-10.2 μm wavelength range HgCdTe detectors cooled to 40 K 24 million pixels Field of View: 11 deg^2 Sky Coverage Rate: 165 square degrees per hour
Attitude Determination and Control	3-axis stabilized Actuators: reaction wheels, thrusters Sensors: Star trackers, IMU Astrometric Accuracy: 0.2 arc seconds Angular Velocity Accuracy: 4.5 arcseconds per hour
Onboard Storage	96 GB
Communications	Small Deep Space Transponder Science Downlink: 1.5 meter high-gain antenna Command and Telemetry: Medium- and low-gain antenna