



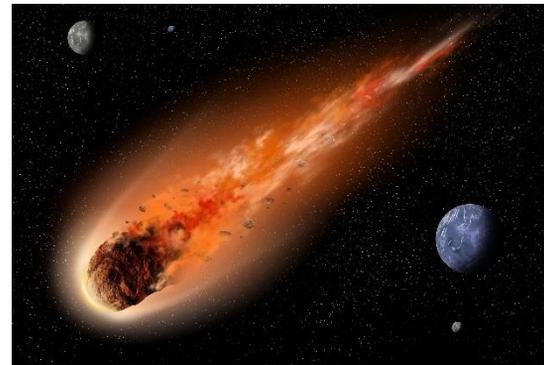
KaBOOM: Ka-Band Objects Observation and Monitoring



Purposes

NASA has embarked on a path to implement a high power, higher resolution radar system to:

- Track Near Earth Objects (NEOs)- asteroids and comets -- 100,000 times more accurately than optical telescopes, as part of a system to defend the Earth from major impacts.
- Determine the size, shape, spin rate, and surface properties of these NEOs to determine which are suitable for eventual visits by crews or mining companies.
- Track orbital debris to ensure crew and spacecraft safety.



Capabilities

In Development and Demonstration

- Low life-cycle cost radio frequency communication at 8 and 30 GHz and radar system at 33-37 GHz
- Phased array of widely-spaced, commercial off the shelf antennas.
- Algorithms that correct for atmospheric twinkling in real-time to maximize the projected power after the signals from each antenna are combined.
- High precision radar imaging using Ka band frequencies to see features as small as 5 cm.
- Available 24/7 for NEO and orbital debris characterization
- Scalable options to enable the deployment of a large element array that includes capability to be upgraded to a larger network of antennas designed to track asteroids and determine how close to Earth they will come.



Studies in Progress

- Johns Hopkins Applied Physics Laboratory monostatic and multistatic radar study to determine optimal parameters and capabilities of large element arrays.
- MIT/Lincoln Laboratory trade study on upgrading KaBOOM from space communication mode to Ka-band radar mode.



KaBOOM site at Kennedy Space Center

Future Forward - Evolutionary Steps to a Revolutionary Capability

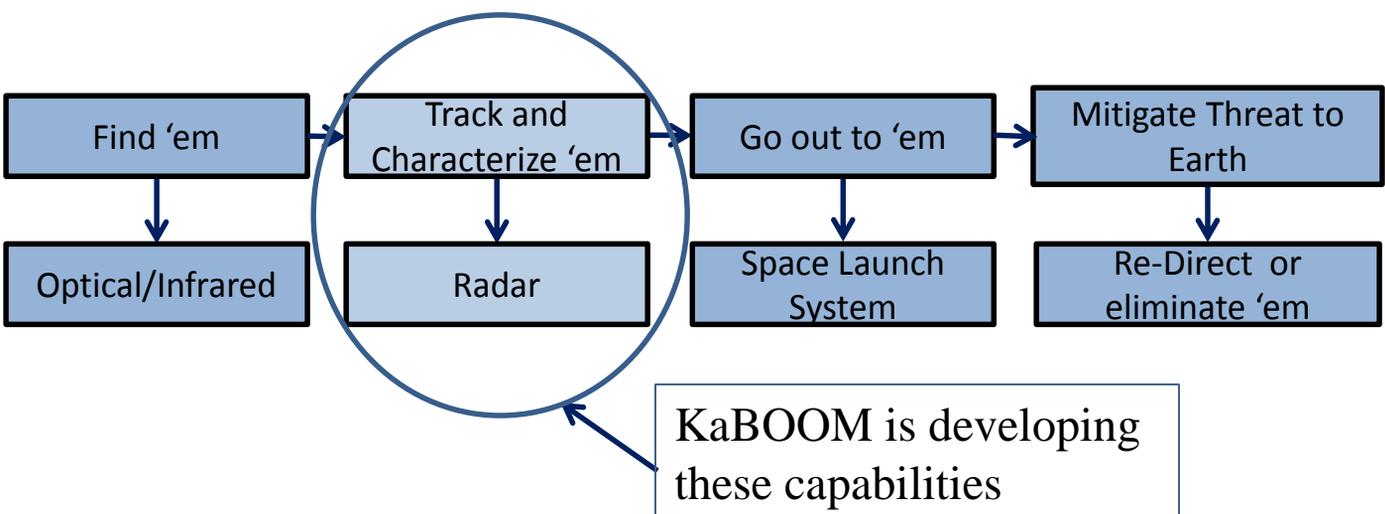
KARNAC (Ka band Array Radar for NEO Accurate Characterization): KaBOOM will be transformed to a radar facility. Each antenna will have a transmitter of 25 kW peak power in the 34-36 GHz range. The total combined uplink power will be ~ 225 kW.

SOAR (Space Object Array Radar): Large element radar array for both X and Ka-band high precision tracking, imaging and characterization of near Earth objects and orbital debris.

Reference

High Resolution Radar for NASA and Space Situational Awareness for Observation and Monitoring,
Geldzahler et al. <http://www.amostech.com/TechnicalPapers/2014.cfm>

NEO Avoidance Plan



Contact Information:

Dr. Barry Geldzahler barry.geldzahler@nasa.gov 202-358-0512