

## BROADBAND FOR SPACE



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## NASA LASER COMMUNICATION GROUND STATION



## PACIFIC INTERNATIONAL SPACE CENTER FOR EXPLORATION SYSTEMS (PISCES)

PISCES is a Hawaii State Government Aerospace Agency located in Hilo, Hawaii that conducts environmentally-safe field tests on Hawaii's volcanic terrain to test and validate advanced space technologies. These space technologies include robotics, advanced manufacturing, and advanced communications - all with dual purposes: for use in space as well as here on Earth.

### *PISCES Projects*

- Lunar Concrete
- Women's STARS Program
- 3-D Laser Printing Project
- Moon RIDERS
- PISCES Planetary Analogue Test Sites
- **NASA Laser Communication Ground Station**
- PISCES Robotic Village
- PRISM (PISCES Robotic International Space Mining) Competition



# NASA LASER COMMUNICATION GROUND STATION (LCGS)

## What is the NASA LCGS?

The laser communication ground station will be the first operational system to use laser light for relaying communications between Earth and space. It will provide service to both robotic and human spacecraft while handling communications for exploration experiments on the slopes of Mauna Kea and Mauna Loa.

## Why lasers?

Laser signals work like traditional radio frequency (RF) signals, but are capable of supporting data transfer rates up to 10 times faster! They require smaller antennas and consume less power over longer distances. Laser light also operates in a less-crowded field of the electromagnetic spectrum than RF and microwave frequencies, which are nearly at full capacity.

## Where will the LCGS be built?

NASA desires to build the ground station on one of Hawaii's volcanic mountains where there is minimal signal interference.

## When will it be operational?

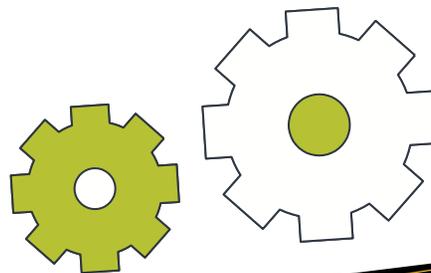
The project involves three phases, with phase one beginning in 2015 and a fully operational station aimed for 2020.

## How will it benefit Hawaii?

The project will create 21<sup>st</sup> century jobs, high-technology broadband communications, and economic development for residents of the Aloha State.

## When did NASA first test laser light for communication in space?

NASA demonstrated its first laser communication system in space on October 20<sup>th</sup> 2013, successfully transmitting data at a record-breaking speed from Earth to the Lunar Atmosphere and Dust Environment Explorer spacecraft (LADEE) orbiting the moon.



Above: Laser transmitter and receiver telescopes for laser communication (NASA/MIT). Below: Artist rendering of the LADEE spacecraft communicating with Earth via laser (NASA).

