SPACEX CRS-8 MISSION OVERVIEW

SpaceX's eighth contracted cargo resupply mission with NASA to the International Space Station will deliver almost 7,000 pounds of science and research, crew supplies and vehicle hardware to the orbital laboratory and its crew. Launch is targeted for Friday, April 8, 2016.

The spacecraft will launch aboard a Falcon 9 rocket from Cape Canaveral Air Force Station in Florida and arrive at the space station two days later. Expedition 47 crew members Jeff Williams and Tim Kopra of NASA, Tim Peake of ESA (European Space Agency) and cosmonauts Yuri Malenchenko, Alexey Ovchinin and Oleg Skripochka of Roscosmos are currently living aboard the orbiting laboratory. Peake and Williams will use the station's robotic arm to capture Dragon when it arrives on station. The spacecraft will be berthed to the Earth-facing port on the Harmony module.

Dragon will carry hardware and supplies to support dozens of the of approximately 250 science and research investigations that will occur during Expeditions 47 and 48. The unpressurized trunk of the spacecraft will also hold the Bigelow Expandable Activity Module, an expandable habitat technology demonstration on the International Space Station. After four weeks at the space station, the spacecraft will return with more than 3,500 pounds of cargo, including science experiment samples, space station hardware, and trash.

TOTAL CARGO:	**6913.7 lbs. / 3136 kg**
TOTAL PRESSURIZED CARGO WITH PACKAGING:	**3798.5 lbs. / 1723 kg**
• *Science Investigations*	*1410.9 lbs. / 640 kg*
• *Crew Supplies*	*1205.9 lbs. / 547 kg*
• *Vehicle Hardware*	*674.6 lbs. / 306 kg*
• *Spacewalk Equipment*	*26.4 lbs. / 12 kg*
• *Computer Resources*	*238.1 lbs. / 108 kg*
• *Russian Hardware*	*72.7 lbs. / 33 kg*
UNPRESSURIZED	
• *Bigelow Expandable Activity Module (BEAM)*	*3115.1 lbs. / 1413 kg*

Installation and Undocking Overview:
About 10 minutes after launch, Dragon reaches its preliminary orbit. It then deploys its solar arrays and begins a carefully choreographed series of thruster firings to reach the space station. After a two-day trip, Peake and Williams will use the station's 57.7-foot (17.6-meter) robotic arm to reach out and capture the Dragon spacecraft as they operate from the station's Cupola. Ground commands will be sent from Houston for the station's arm to install Dragon on the bottom side of the Harmony module for its stay at the International Space Station. By the next day, the crew will pressurize the vestibule between the station and Dragon and open the hatch that leads to the forward bulkhead of Dragon.

During the next four weeks, the crew will unload the spacecraft and reload it with cargo to return to Earth. About five and a half hours after it departs the station, it will splash down in the Pacific Ocean off the coast of Baja, California.

SPACEX CRS-8 SCIENCE OVERVIEW

The new experiments arriving to the orbital laboratory will help investigators test the use of an expandable space habitat in microgravity, assess the impact of antibodies on muscle wasting in a microgravity environment, use microgravity to seek insight into the interactions of particle flows at the nanoscale level and use protein crystal growth in microgravity to help in the design of new drugs to fight disease.

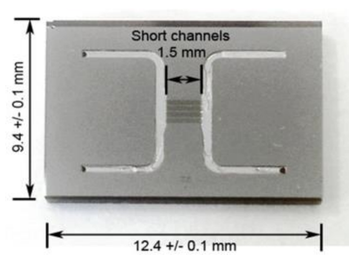
The Bigelow Expandable Activity Module (BEAM) is an experimental expandable capsule that attaches to the space station.
Credits: Bigelow Aerospace, LLC

BEAM is an experimental expandable capsule that attaches to the space station. NASA is evaluating different habitat concepts that can sustain astronauts in the harsh environment of deep space. Expandable habitats greatly decrease the amount of transport volume at launch for future space missions, and take up less room on a rocket, but once set up, provide additional volume for living and working. They also may protect against solar radiation, and be an additional barrier protecting the crew from space debris and other contaminants.
Fully expanded, BEAM will be 13-feet-long and 10.5 feet in diameter. During the two-year test mission, astronauts will enter BEAM three or four times a year for a few hours to retrieve sensor data and conduct assessments of the module's condition.

Astronaut Scott Kelly is photographed working with the Microgravity Sciences Glovebox (MSG) during a separate CASIS Rodent Research session using the Bone Densitometer
Credits: NASA

Rodent Research-3-Eli Lilly will assess myostatin inhibition for preventing skeletal muscle atrophy and weakness in mice exposed to long-duration spaceflight. The investigation is sponsored by pharmaceutical company Eli Lilly and Co. and the Center for the Advancement of Science in Space (CASIS) and studies molecular and physical changes in the musculoskeletal system that happen in space. Crew members experience significant decreases in their bone density and muscle mass during spaceflight if they do not get enough exercise during long- duration missions. Ultimately, drugs tested on the space station could progress to terrestrial human clinical trials, and would be validated for use on future space missions to maintain crew members' physical health during long-duration missions.

Microchannel Diffusion is study of fluids at the nanoscale, or the atomic level, and holds promise for a wide range of technologies. Nanofluidic sensors could measure the air in the space station, or be used to deliver drugs to specific places in the body, among other potential uses. But the laws that govern flow through nanoscale channels are not well understood. This investigation simulates these interactions by studying them at a larger scale, the microscopic level. This is only possible on the orbiting laboratory, where Earth's gravity is not strong enough to interact with the molecules in a sample, so they behave more like they would at the nanoscale. Knowledge gleaned from the investigation may have implications for drug delivery, particle filtration and future technological applications for space exploration.



Optical image of the Microchannel Diffusion device.
Credits: Houston Methodist Research Institute

CASIS Protein Crystal Growth 4 has applications in medicine, specifically drug design and development. It has been established that growing protein crystals in microgravity can avoid some of the obstacles inherent to protein crystallization on Earth, such as sedimentation. One investigation will study the effect of microgravity on the co-crystallization of a membrane protein with a medically relevant compound in microgravity in order to determine its three-dimensional structure. This will enable scientists to chemically target and inhibit, with "designer" compounds, an important human biological pathway that has been shown to responsible for several types of cancer.