

Lockheed Martin readies one of the most sensitive IR instruments ever made for NASA telescope

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NIRCам (left) beat requirements during final cryogenic testing with the Integrated Science Instrument Module for the James Webb Space Telescope. The module recently completed testing at NASA's Goddard Space Flight Center.

The ultra-sensitive, highly precise Near Infrared Camera (NIRCам) instrument for the James Webb Space Telescope (Webb telescope) beat its most stringent requirements during Integrated Science Instrument Module (ISIM) testing, which is now complete. Lockheed Martin built the instrument for the University of Arizona and NASA to serve as both the primary science instrument and the primary mirror-alignment sensor aboard the telescope.

Unlike other space observatories like the Hubble Space Telescope, the Webb telescope does not use a single monolithic [primary mirror](#). Instead its primary mirror is made up of 18 individual, adjustable segments that will be aligned in space using NIRCам.

"NIRCам has to work in order for the James Webb Space Telescope to work," said Alison Nordt, NIRCам program manager at Lockheed Martin. "That's because the alignment of the primary mirror segments depends on NIRCам to determine how to adjust the segments correctly. During [instrument testing](#) at Lockheed Martin, we tested the camera in two parts, and the [optical performance](#) was excellent. Now it has been tested at a higher level of assembly—both before and after flight-like vibration—and the optical performance is extremely stable."

NIRCам performed better than requirements in the recent tests at ultra-cold cryogenic temperatures. When performance is measured in nanometers, precision takes on new meaning. For example, the recent test results show the NIRCам absolute wavefront performance—or its measure of accuracy—to be between 32 and 52 nm (much better than the requirement of less than 93 nm). To get an idea of how precise that is, a human cell is several thousand nm across, and 52 nm is roughly 1/40th of the wavelength of the light being measured. Moreover, not only is optical performance better than required, it is rock-steady having shown no measurable change between tests.



NIRCam beat requirements during final cryogenic testing with the Integrated Science Instrument Module for the James Webb Space Telescope. The module recently completed testing at NASA's Goddard Space Flight Center. Credit: NASA

Lockheed Martin delivered NIRCam to NASA in March 2014 to be installed into the ISIM. Now that NASA completed ISIM trials, technicians will integrate the instrument cluster with the optical telescope element for combined testing. Performing better than expected, NIRCam is helping the Webb telescope stay on its path to launch, which is scheduled for October 2018.

NIRCam is one of many precision optical payloads Lockheed Martin designs, develops and produces. Through the Optical Payload Center of Excellence and the Advanced Technology Center, Lockheed Martin has a deep understanding of optical and infrared missions and their technologies, building on decades of experience to deliver high-performing and reliable optical systems.

Provided by Lockheed Martin

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