

Exploring planets in distant space and deep interiors

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In recent years researchers have found hundreds of new planets beyond our solar system, raising questions about the origins and properties of these exotic worlds—not to mention the possible presence of life. Speaking at a symposium titled "The Origin and Evolution of Planets" held at the annual meeting of the American Association for the Advancement of Science, two Carnegie Institution scientists will present their perspectives on the new era of planetary exploration.

Alan Boss of Carnegie's Department of Terrestrial Magnetism and author of the new book *The Crowded Universe: The Search for Living Planets* points out that evidence for all three classes of planets known in our Solar System—ice giants, gas giants, and terrestrial (rocky) planets—has been detected in extra-solar systems. "We already know enough now to say that the Universe is probably loaded with terrestrial planets similar to the Earth," he says. "We should expect that there are going to be many planets which are habitable, so probably some are going to be inhabited as well."

Boss expects that NASA's Kepler spacecraft, due to launch in early March and dedicated to searching for Earthlike planets, will put his ideas to the test.

Russell Hemley, director of Carnegie's Geophysical Laboratory, studies the fundamental physics and chemistry of materials under extreme conditions. Understanding how the chemical building blocks of planets, such as hydrogen, oxygen, silicon, iron, and other crucial elements such

as carbon, respond to conditions in the deep interior of planets, where pressures can exceed those on the surface by factors of millions, is key to understanding how planets might form and evolve. High-pressure studies can also offer clues to the search for life on planets different from our own.

"Our work is uncovering not only exciting new physics and chemistry, but also new findings in biology that are relevant to the prospects for life in whatever form beyond the Earth," says Hemley. "Experiments are showing that there is viability of life as we know it now under surprisingly extreme conditions."

Source: Carnegie Institution

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