NJIT scientist creates instrument for NASA Aug. 23 launch

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NJIT Distinguished Research Professor and former Bell Labs scientist Louis J. Lanzerotti, will see his 50-year quest to better understand space weather and Earth's Van Allen Radiation Belts rocket, once again, into space on Aug. 23, 2012. This is when NASA's twin Radiation Belt Storm Probes (RBSP) begin their mission to study the extremes of space weather. Lanzerotti, today one of the most respected and valued scientists behind space exploration, was the principal investigator to build one of five instruments aboard each of the two spacecraft that comprise the RBSP mission.

The mission is part of NASA's Living With a Star program which is managed by Goddard Space Flight Center. The Johns Hopkins University Applied Physics Laboratory (APL) manages the mission and has built and will operate the two RBSP spacecraft for NASA. RBSP begins its exploration with a predawn Aug. 23, 2012 launch aboard a United Launch Alliance Atlas V 401 rocket. Each RBSP spacecraft weighs about 660 kilograms (1,455 pounds) and carries an identical set of five instrument suites that will enable scientists to unlock the mysteries of the radiation belts surrounding Earth.

For Lanzerotti, a long-time New Jersey resident, the upcoming launch (and he says now his last) strikes a deeper, personal chord, harkening back to the start of his career in 1965 at the former AT&T Bell Labs, then the dream job of every young physicist. His charge was no less monumental than to analyze radiation data returned prior to the unexpected demise of the first active communications satellite, the 1962

Telstar I. The then state-of-the-art telecommunications pioneer measured 36 inches wide, weighed 170-pounds and carried innovations such as transistors and solar panels, supporting 600 voice calls and one black and white television channel. To grasp the contrast between the new and old, click here.

Massive influxes of radiation—some of it natural--from the Van Allen belts and some of it man-made from nuclear testing-- doomed Telstar I after only eight months. Still, before its demise, Telstar was able to mark the dawning of the age of modern telecommunications, carry the first transatlantic television signal and prove that satellite communications was feasible. Lanzerotti recently spoke at a celebration commemorating the 50th anniversary of Telstar I hosted by Alcatel-Lucent.

"Bell Labs Engineer John Pierce who proposed the pioneering Telstar satellite did not expect Earth's space environment to be anything, but benign," recalled Lanzerotti. "James Van Allen's discovery of the radiation belts showed this not to be the case, so Telstar carried special sensors designed by Bell Labs physicist Walter Brown to measure the radiation environment that Telstar would encounter."

Fifty years later, researchers like Lanzerotti and others on the RBSP team and in heliophysics understand much more about the hazards posed by highly-charged particles in the radiation belts – though the processes that drive and shape the belts are still poorly understood. Those mysteries are the focus of the RBSP mission: Modern society's dependence on satellites and other spaced-based technologies that must operate in the belts makes the research that will come from RBSP's data valuable to building better-protected satellites in the future. "We know considerably more now about the space environment and space weather," says Lanzerotti, "and RBSP will be a major step forward in quantifying and eventually predicting conditions in space around Earth."

The two spacecraft will fly in nearly identical, eccentric orbits that cover the entire radiation belt region, lapping each other several times over the course of the two-year mission. This will give researchers an unparalleled view into the mechanics and processes that change the size and intensity of the radiation belts over time. RBSP will explore space weather – changes in Earth's space environment caused by changes in the sun's energy flow – and especially its extreme conditions, which can disable satellites, cause power grid failures and disrupt GPS services.

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