



TYRES, WHEELS & ACCESSORIES EXPOSITION OF THE AMERICAS

Dr. Franklin R. Chang Díaz ***Chairman and CEO, Ad Astra Rocket Company***

Franklin Chang Díaz was born April 5, 1950, in San José, Costa Rica, to the late Mr. Ramón A. Chang Morales and Mrs. María Eugenia Díaz Romero de Chang. At the age of 18, after completing his secondary education at Colegio de La Salle in Costa Rica, he left his family to immigrate to the United States. It was the dawn of the space age and his dream was to become a rocket scientist and ultimately an astronaut.

After arriving in Hartford Connecticut in the fall of 1968, in order to learn English, he enrolled as a senior student at Hartford Public High School where he graduated in the spring of 1969. That year he earned a scholarship to the University of Connecticut. On July 20th, 1969, Franklin Chang Díaz was one of millions throughout the world who watched Neil Armstrong set foot on the surface of the Moon. The moment had a special significance to him, as he prepared to enter his freshman year at UConn.

His four years at the university led him to a BS degree in mechanical engineering. At the same time, working as a research assistant in the university physics laboratories, he also acquired a number of early skills as an experimental physicist. This was the skill mix that he considered important for his chosen career in space. However, two important events affected his path after graduation: first, the early cancellation of the Apollo Moon program, which left many space engineers out of work and virtually eliminated any opportunities in that field and second, the world energy crisis, which resulted from the first oil embargo of

1973 by the Organization of Petroleum Exporting Countries (OPEC) and provided a boost to new research on energy.

Although confident that things would ultimately change in space, he decided to strengthen his energy-relevant engineering expertise while not departing too far from his pursuit of space. He chose graduate studies in controlled thermonuclear fusion, a potential source of unlimited energy for the world and what, he believed, would be the ultimate source of power for future spaceships. Thus, following graduation in 1973, he entered graduate school in the department of nuclear engineering at the Massachusetts Institute of Technology (MIT). His graduate research in the field of plasma physics involved him heavily in the United States' controlled thermonuclear fusion program, managed then by the US Atomic Energy Commission. His doctoral thesis focused on the conceptual design and operation of future reactors capable of harnessing fusion power. He received his doctorate degree in 1977 and in that same year, he became a US citizen.

After MIT, Dr. Chang Díaz joined the technical staff of the Charles Stark Draper Laboratory where he continued his research in fusion technology. It was in that year, that the NASA Space Shuttle Enterprise made its first successful atmospheric test flight and re-energized the moribund US Space Program. In 1979, following this success, NASA issued a nationwide announcement looking for a new



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group of astronauts for the Space Shuttle Program. In addition to US citizenship and in contrast to earlier such announcements in the 1960s, the qualification requirements also included an advanced scientific degree. Dr. Chang Díaz was ready.

In May of 1980, Dr. Chang Díaz was one of 19 astronaut candidates selected by NASA from a pool of more than 3,000 applicants. He thus became the first naturalized citizen to join the US Astronaut Program and also the first person from Latin America. In August of 1981, after completing his basic training, he received his astronaut wings and became eligible for space flight assignment. As part of his training, Dr. Chang Díaz became involved in astronaut flight support functions on the ground at the Johnson and Kennedy space flight centers. He served as capsule communicator (CAPCOM) at the Houston Mission Control Center for the 8th and 9th space shuttle missions, and in 1985 was leader of the astronaut team at the Kennedy Space Center. During his training at NASA, Dr. Chang Díaz logged over 1,800 hours of atmospheric flight time, including 1,500 hours in high performance jet aircraft.

Dr. Chang Díaz achieved his dream of space flight on January 12, 1986 on board the Space Shuttle Columbia on mission STS 61-C. During the 6-day flight the crew deployed the SATCOM KU satellite and conducted a number of scientific experiments. After 96 orbits of the Earth, Columbia and her crew made a successful night landing at Edwards Air Force Base in California's Mohave desert.

After a nearly 3-year hiatus, following the Challenger disaster of January 28, 1986, Dr. Chang Díaz flew a (world) record 6 more space missions: STS 34 (Atlantis, October 18-23, 1989), STS 46 (Atlantis, July 31-August 8, 1992), STS 60 (Discovery, February 3-11, 1994), STS 75 (Columbia, February 22 - March 9, 1996), STS 91

(Discovery, June 2-12, 1998) and STS 111 (Endeavour, June 5- 19, 2002.) These missions contributed to major US space accomplishments, including the successful deployment from the shuttle of the Galileo spacecraft to Jupiter, the operation of the Alpha Magnetic Spectrometer, a major international particle physics experiment probing the cosmic nature of antimatter and dark matter, the first and last missions of the US-Russian Shuttle-MIR program that prepared both countries for joint operations in space and, most recently, on three separate space walks, totaling more than 19 hours outside the spacecraft, Dr. Chang Díaz led the installation of the Mobile Base System (MBS) on the main truss of the International Space Station (ISS) and conducted major repairs on the Canadian Robotic Arm of the ISS. With his seven missions to date, Dr. Chang Díaz has logged over 1,600 hours in space.

While at NASA, alongside with his astronaut duties, Dr. Chang Díaz continued his research in applied plasma physics, this time, investigating applications to rocket propulsion. His 1979 concept of a plasma rocket became the VASIMR plasma engine, embodied in 3 NASA patents to his name. In 1994, he founded and directed the Advanced Space Propulsion Laboratory (ASPL) at the Johnson Space Center where he managed a multi-center research team to develop this propulsion technology.

On July 8, 2005, after 25 years of government service, Dr. Chang Díaz retired from NASA to continue his work on the VASIMR through the private sector. Initiating a career as a space entrepreneur, he is founder and current Chairman and CEO of Ad Astra Rocket Company, www.adastrarocket.com, a US private firm based in Houston Texas, with research operations in Houston and Costa Rica. After eight years of operation, Ad Astra has matured the VASIMR technology to a near space flight readiness level. The firm has signed an



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agreement with NASA for the testing of the engine in space on the International Space Station, a goal currently planned for late 2016. Following this initial test, Ad Astra plans to be a major contributor to a new wave of human and robotic commercial space activities emerging worldwide.

On December 8, 2009, Dr. Chang Díaz was elected to the Board of Directors of Cummins Inc., <http://www.cummins.com/cmi/>, a global power leader headquartered in Columbus, Indiana, (USA). He also serves on the Board of Directors of Earth University <http://www.earth.ac.cr/>, an international educational institution located in Costa Rica and devoted to sustainable development. In 2008 he also joined the Administrative Board of the Arias Foundation for World Peace <http://www.arias.or.cr/>.

Throughout his years in the United States, Dr. Chang Díaz has looked to promote education, science, technology and space in Latin America. In 1990 He led a Latin American team of space scientists in the organization of the first UN-Sponsored "Space Conference of the Americas," in Costa Rica, encouraging regional integration and collaboration in space science and technology. Five other such conferences in Chile, Uruguay, Colombia, Ecuador and Mexico followed the Costa Rica initiative in subsequent years. Dr. Chang Díaz was the principal architect of the ChagaSpace Project, the first multinational space experiment in Protein Crystal Growth with medical applications by the

countries of Latin America. More recently, he has been active in his native Costa Rica on the implementation of the "Strategy for the XXI Century" <http://www.estrategia.cr/>, a master plan, which he spearheaded in 2004, aimed to transform Costa Rica into a fully developed nation by the year 2050. He has also been active in his community of Liberia, Guanacaste where he leads the Asociación de Apoyo Comunal Liberiana <http://www.liberianueva.com/>, a community organization devoted to improving the City of Liberia.

In his long career, Dr. Chang Díaz has received many honors, the most significant of which include the Liberty Medal in 1986 from President Ronald Reagan at the Statue of Liberty Centennial Celebration in New York City and NASA's Distinguished Service Medal, the agency's highest honor, which he has received four times. He was inducted in the US Astronaut Hall of Fame on May 4, 2012 and holds many honorary doctorates from universities in the United States and Latin America. He has continued to serve in academia as an Adjunct Professor of Physics at Rice University and the University of Houston supervising PhD. and MS level students on their research. He is married to the former Peggy Marguerite Stafford of Alexandria, Louisiana and has four daughters: Jean Elizabeth (39) Sonia Rosa (35), Lidia Aurora (24) and Miranda Karina (18). He enjoys music, flying and scuba-diving. His mother, brothers and sisters still reside in Costa Rica.

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