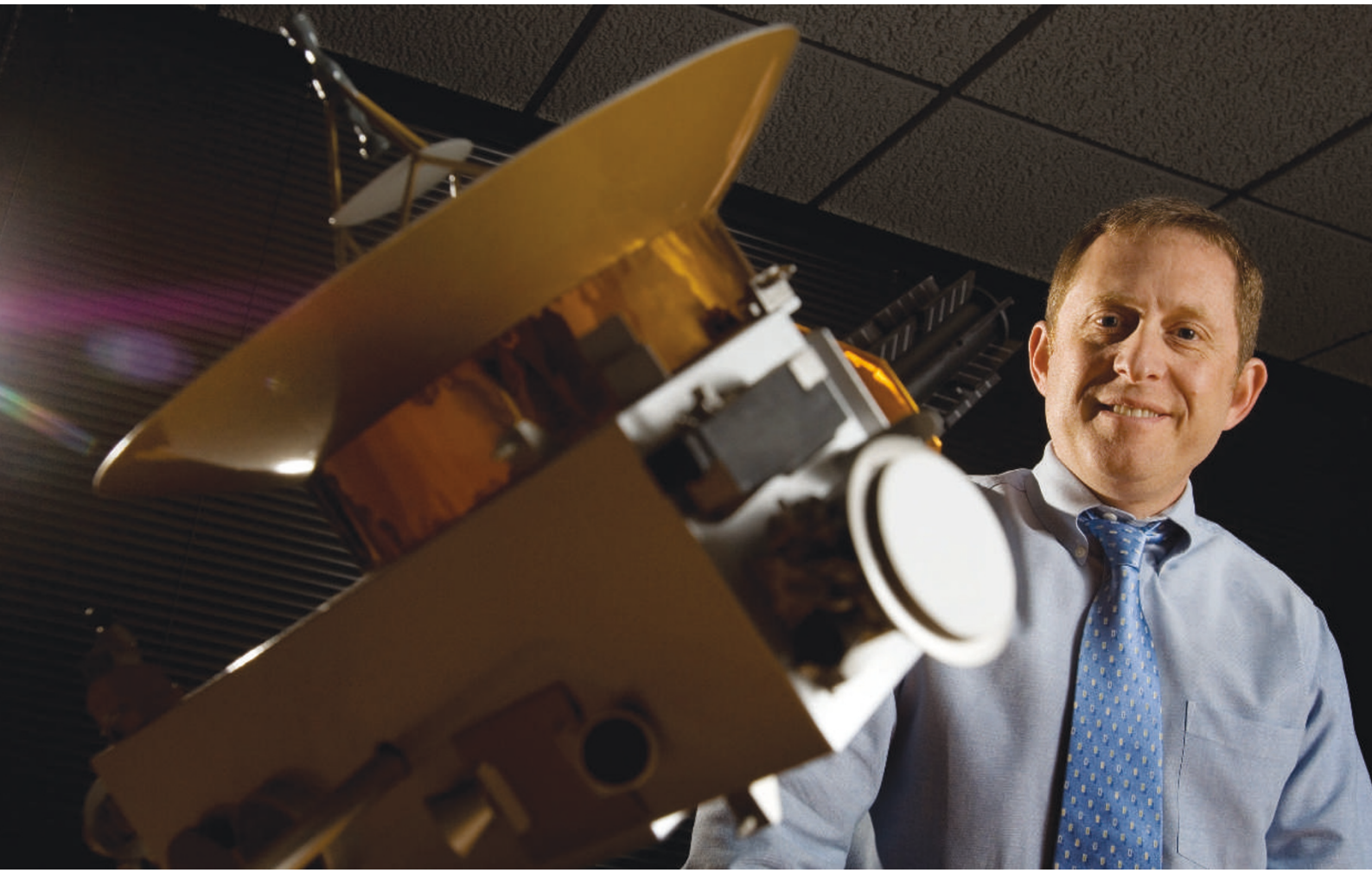

K. MOLONEY

A man with a mission

In 2015, Pluto will welcome its first visitor, a robot named New Horizons. **Amanda Haag** meets the planetary scientist who nursed the mission through its darkest days.

In the spaceflight business, delayed gratification is often part of the deal. The time between a launch and the scientific payoff may be a decade or more. So for the man leading a mission that is about to begin its ten-year voyage to Pluto, the downtime of space travel promises one sure thing: more time for research.

Planetary scientist Alan Stern is principal investigator for NASA's New Horizons mission — slated for a January launch — to Pluto and the frosty worlds beyond. He has flown in fighter jets to conduct upper-atmosphere experiments, sent instruments to visit comets, and qualified as a mission specialist for the space shuttle. In between, he led the assembly of one of the world's most élite and creative groups of planetary scientists, based at the Southwest Research Institute (SwRI) in Boulder, Colorado.

Of all these accomplishments, Pluto is likely to be the most public legacy of this 47-year-old space junkie. For years, Stern was for the most part a lone voice arguing for a mission that looked as if it might never get off the ground. Various incarnations of a Pluto spacecraft had been funded and cancelled over a period of 12 years before Stern resurrected the notion in the form of New Horizons. But even then, a two-year funding battle ensued, with New Horizons' future hanging by a budgetary thread. "It took more years to get this mission out of the Washington beltway than it does to cross the entire expanse of the Solar System," he says, only half-joking.

It didn't take that long for the space bug to bite the young Stern. Like many children in the 1960s, he grew up hugely inspired by the Apollo space programme. "Everybody had an astronaut helmet and a little silver Halloween suit," recalls Stern. As a teenager, he was the quintessential space nerd. "Capitalize the 'N'," he jokes. But that fascination didn't always translate to scholastic accomplishment. After years in a strict boys' prep school in Dallas, Stern relished the freedom at the Austin campus of the University of Texas so much that he nearly flunked out and left. Six months later, after working as a dock hand and cutting chicken for a fast-food restaurant, he decided to give academia another shot.

Launched anew

With his trademark intensity, he soon acquired both double undergraduate and double master's degrees. Two years in the aerospace industry convinced him to look at academia as a career option, and in 1983 he landed work at the Laboratory for Atmospheric and Space Physics at the University of Colorado's Boulder

campus. Stern recalls spending one winter in Alaska shooting a sounding rocket into the aurora borealis as a satellite flew through the lights. Soon, one of his primary jobs became helping to build a pair of ultraviolet spectrometers that would study Comet Halley from aboard the space shuttle Challenger. As the project unfolded, Stern gravitated towards the science rather than the engineering. "It really swept me off my feet," he tells me from his downtown Boulder office, with its stunning view of the jagged Flatiron Mountains. "I decided I wanted to be a space scientist as a result."

But his hopes for the project were dashed when Challenger, carrying the Comet Halley experiment, blew up just after launch on 28 January 1986, bringing the US space programme to a standstill. "It looked like everything we were doing in my work would be put off for years," recalls Stern. So within a month, he decided to go back to graduate school. "If there was ever going to be a time to become a scientist, this was probably it."

Building on the vision

Less than two years after completing his doctorate at the University of Colorado — which he did in just three years — Stern was hired to forge a planetary-science group at the SwRI's offices in San Antonio, Texas. The institute was already well known for its strong space-physics research group, but it wasn't on the map for planetary science. "Most places you go, you're going to wait in line for 10 or 15 years to get your shot to lead," says Stern, "but at Southwest, there was nobody in line in front of me in planetary science. It was pretty much mine to make it — or not — which was simultaneously thrilling and terrifying."

Although Stern acquired numerous research grants and won instrument proposals for space missions, he found San Antonio lacking key ingredients: local research universities and a community of planetary-science experts. Few recruits were interested in coming to the city. Then, at a 1993 banquet, Stern found himself seated next to three talented planetary scientists who had turned down offers to join the SwRI. Once the wine started to flow, they told him: "If you guys were in Boulder, or some place with a big research university, we'd be at Southwest." "That," says Stern, "was an epiphany."

Stern became convinced that in order to build the landmark planetary-research group he envisaged, he would have to take a bold step. So he and his boss, magnetospheric scientist James Burch, went straight to SwRI president Martin Goland, who led the institute for 39 years until his death in 1997. Goland threw Stern out of his office twice before finally relenting. Eleven years later, the Boulder office has grown from two scientists to more than 40, with a deep reach in both planetary science and solar physics.

To expand the institute, Stern drew hand-picked scientists from across the country. He lured Dan Durda, an asteroid expert, with the promise of conducting airborne astronomy in fighter jets. Stern and Durda have since perfected a high-performance telescope to study asteroids near the Sun from a vantage point 17,000 metres away. Since joining the SwRI at Boulder, Durda's research has branched out into areas that he says he would never have imagined possible. A cave diver in his spare time, Durda is now developing technologies for exploring under the ice of Jupiter's moon Europa through a partnership at the SwRI. For practice drills, Durda drops his robotic vehicle into deep sinkholes in Mexico. "There is no limit to what you can accomplish here," he says.

Stern designed the department with characteristic calculation. One of his aspirations was to build an interdisciplinary department — funded by the soft money of research grants — that circumvented some of the classic problems of universities. Most importantly, the group is designed to prevent turf wars. By not allowing any given research group to sit together in one area, "there's no territory to claim, and people have to get up and walk past each other all the time", says Stern. The result is a place "that's really crackling with intellectual energy", says David Grinspoon, an SwRI scientist who studies the evolution of Earth-like planets. "You can't help but walk down the hall and before you know it get snared into some interesting project."

A wild success

Soft-money jobs are often viewed as transient positions. But the SwRI at Boulder hasn't lost a single scientist to recruitment, although many of its researchers have been offered positions at competitive institutes. "It's just been a success story wildly beyond what I ever thought would be possible," says Michael Shull, a University of Colorado astrophysicist and one of Stern's PhD advisers. "I think people probably saw it as a stopping point for a couple of years and then on to another job, but they've all ended up staying."

When he's not polishing his departmental efforts, Stern is busy working on comets and other objects in the icy realm beyond Pluto. This distant region some 5 billion to 8 billion kilometres from the Sun, known as the Kuiper belt, turns out to have swarms of frosty objects orbiting along with Pluto and its sister moon, Charon. "It's kind of the Solar System's attic, with all kinds of things stuffed away up there," says Stern, "like a huge number of small and moderate-sized 'planets' that no one expected even 20 years ago."

Stern is also working on NASA's Lunar Reconnaissance Orbiter, set to reach the Moon at the end of 2008 or in early 2009. He is principal investigator for the ultraviolet spectrometer on the orbiter, as well as for the European Space Agency's Rosetta mission, which will orbit its comet destination beginning in 2014. And if all goes well, the New Horizons mission will fly by Pluto and Charon in 2015. "I'm looking to have one heck of a bang-up decade in the teens," he says.

M. GARLICK/SPL

Out of the shadows: Alan Stern and his team aim to cast light on Pluto and moon Charon, simulated here.

However frenetic the pace, Stern also manages to be a husband and father of three. The first day we meet, he is rushing out the door to take his oldest daughter, Sarah, shopping for her first car. On weekends, he spends time individually with each of his children. His wife Carole says they've had to be creative to adapt to Stern's exhausting travel schedule, which often means he makes 40 to 50 trips a year.

So what does Stern hope will turn up when New Horizons flies by Pluto? At a conference in 1993, during an early incarnation of Pluto mission studies, scientists placed their predictions about what mysteries Pluto might hold into sealed envelopes. They'll be opened when a spacecraft makes it to the planet. "You're not supposed to tell what your prediction is," says Stern. Breaking into his characteristic grin, he adds: "But I'm going to tell you mine."

I lean forward, full of suspense. "I wrote," he says, "that when we get to Pluto — and this is my entire prediction in two words — we would find 'something wonderful'. We've never been to any two places that are the same in the Solar System. So we always learn something completely wonderful." ■

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