POSTCARDS FROM THE Galaxy

As the American space program goes private, space tourism is preparing for liftoff.

BY SARAH ROSE

It was a moment of triumph, and Sir Richard Branson was savoring it: His VSS Enterprise had just gracefully touched down at San Francisco International Airport to become the first spaceship to land at a commercial airstrip. Striding through the terminal afterward, the Virgin Group founder could not help but gloat a little.

"Gorbachev offered me the chance to be the first space tourist," Branson said, recalling a conversation with then Soviet president Mikhail Gorbachev in the 1980s. "But I told him, why buy a ticket to space for $35 million when you can build a spaceship company?"

Branson declined the offer, and founded Virgin Galactic in 1999, a time when the business of ferrying tourists into space seemed like a crazy idea. Just 13 years later, he is at the forefront of a new space race. While there is still no private concern putting humans beyond the reach of gravity, Branson and his competitors are rushing to complete vessels certified for

Spaceport America in New Mexico, the launchpad for Virgin Galactic.

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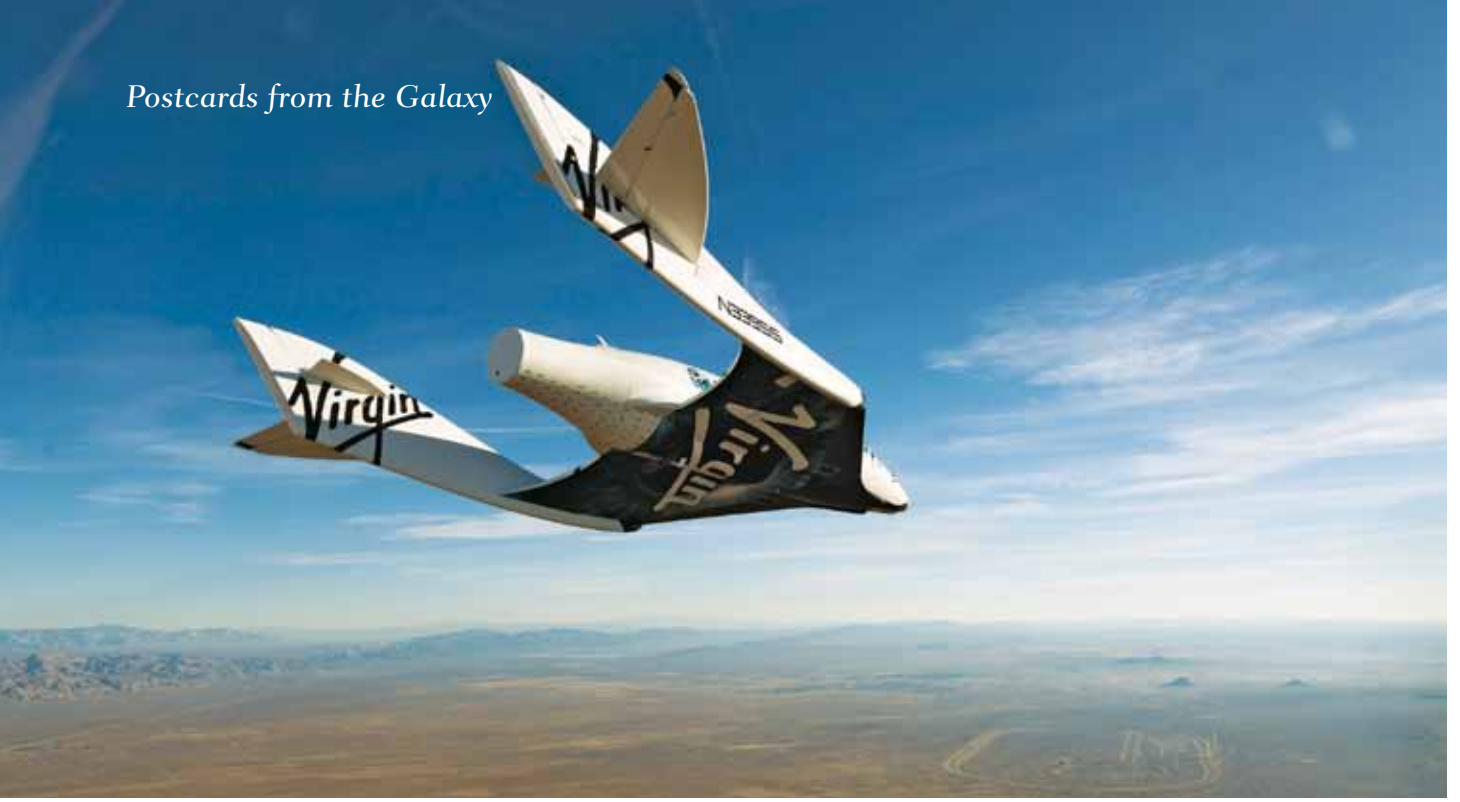

commercial space flight. Dedicated "spaceports" have been built in New Mexico and, soon, Curaçao. There are plans for $150 million pleasure trips around the moon and, for bargain hunters, a program to redeem KLM frequent-flier miles for space journeys.

All that is needed is a working spaceship. And speeded by NASA's grounding of the space shuttles last year, developments have been coming fast. The agency invested $269.3 million in 2011 among four private companies—Boeing, Sierra Nevada, Blue Origin, and SpaceX—that are developing rockets or spacecraft to haul cargo or astronauts. In addition, Amazon's Jeff Bezos, SpaceX's Elon Musk, and computer-gaming magnate John Carmack have been investing considerable personal fortunes in the construction of spaceships for what is expected to be a profitable commercial space business.

"It started out as a very fringe group with very fringe ideas," says Dezsö Molnár, an inventor and judge of the Ansari X Prize, a challenge designed to catapult the private space industry the way aviation prizes did commercial airlines in the early 20th century. "Now our goal is to effectively replace the space shuttle. The fringe folks have become establishment."

VIRGIN GALACTIC ACHIEVED its first major breakthrough in 2004, when engineer Burt Rutan and his SpaceShipOne launched the first nongovernment manned spacecraft into space twice within two weeks. That year, Rutan and his team won the $10 million Ansari X Prize, and SpaceShipOne became the prototype for Branson's enterprise.

In October 2010, Virgin's SpaceShipTwo was successfully released from its carrier mothership for the first time. In May 2011, a month after the successful touchdown in San Francisco, it was launched at 51,500 feet to begin testing its feathered reentry system, in which the craft uses aerodynamics to control its descent, somewhat like a badminton birdie. Eventually, when paying guests are aboard, the six-passenger vessel will continue up from such altitudes, flying three times faster than the speed of sound to pass the Kármán line, the arbitrary point 62 miles above the Earth that marks the end of the atmosphere and the beginning of space.

In October, for the building's dedication, Branson clutched a Champagne bottle and rappelled down the face of a new Norman Foster–designed steel-and-glass space terminal in New Mexico: the Virgin Galactic Gateway to Space, located outside of White Sands National Monument at the Spaceport America complex. Branson refuses to say how much he has invested in Virgin Galactic—the Virgin Group has reportedly poured $270 million into the Galactic division—but like many others, Branson is bullish on the space market. Nearly 500 passengers have already handed over about $57 million in bookings on Virgin Galactic alone.

But so far, only seven tourists have actually traveled beyond the stratosphere. American businessman Dennis Tito was the first, paying $20 million to fly to the International Space Station (ISS) aboard a Russian Soyuz rocket in 2001. The other six private passengers also bought seats on Soyuz rockets and flew to the space station, paying $20 million to $35 million. (One liked it so much, he visited twice.)

After Tito made his flight, a 2002 study by Maryland-based consulting firm Futron estimated the size of the space-travel market and found that there are few billionaires willing to spend millions for a long stay in space—but there are plenty of travelers who would spend a few hundred thousand for a quick peek at the final frontier. Futron's estimates suggest there could be more than 15,000 space tourists annually by 2021, generating more than $700 million in sales. "It could

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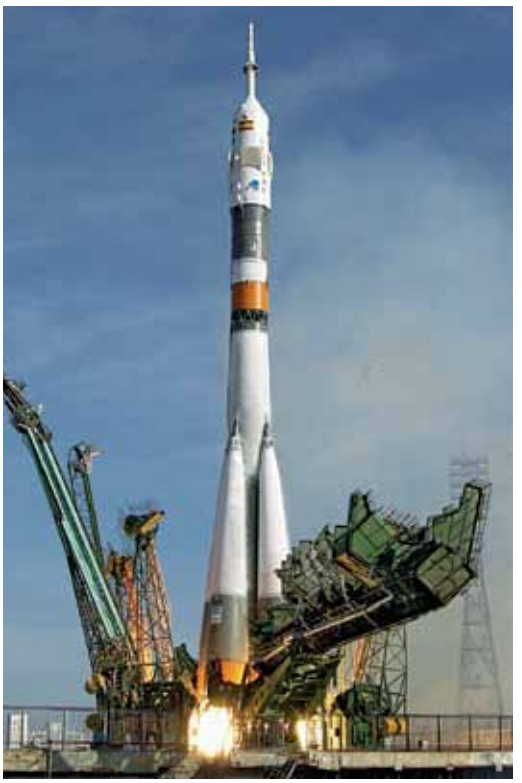
Virgin Galactic's VSS Enterprise could be transporting tourists into space by the end of the year. Almost 500 have already bought tickets.

be like a flight on Concorde," says astronaut Buzz Aldrin, who was present when VSS Enterprise made its historic landing in San Francisco. "It will be a once-in-a-lifetime experience, not an everyday thing."



INDEED, GETTING TO space and staying among the stars are very different trips, with vastly different costs. At $200,000, Virgin Galactic's 2.5-hour adventure is comparatively inexpensive, but passengers are paying for what is called a suborbital flight: a ride to the "edge" of the Earth's atmosphere and no further. These suborbital tourists can see the blackness of space, look back at the curvature of the Earth, and experience a few minutes of microgravity or weightlessness. Spaceships in this category never hit orbital speeds—about 17,500 miles per hour—and so they arc back into the atmosphere after four or five minutes. Think of it as "space lite."

"It's like popping a Champagne cork," says Canadian astronaut Chris Hadfield, who will crew the ISS later this year and command it in 2013. "But with a pretty cool view out the window."

Those five minutes in heaven will be within reach of many more luxury travelers: In addition to Virgin Galactic, Carmack's Armadillo Aerospace is selling seats at $102,000, and XCOR Aerospace has tickets on its Lynx spacecraft for $95,000 through TripAlertz. KLM airlines affinity members will be able to fly Lynx free from a spaceport in Curaçao using frequent-flier miles. "It will be on the order of a bungee jump," Hadfield says. "Cool. Interesting. But transient."

Flights to orbit are an altogether different space vacation. The seven Soyuz space tourists have circled the Earth, docked with the International Space Station, and lived onboard with professional astronauts. These space outings remain for sale, but are orders of magnitude more expensive. To start, it takes 70 times more energy to escape the Earth's gravitational pull. Also, Russia raised prices 20 percent after the United States' space shuttles retired in July, from $51 million to $63 million.

For orbital tourists, there is only one way up, and there are only 12 seats annually on Soyuz rockets—all booked solid with agency astronauts through 2016. "There's an awful lot of talk, but when you look at the vehicles that are safely capable of getting to orbit, there are not a lot of options and very few seats," says Hadfield. "Without a ship, you're not going."

To accommodate private passengers, Russia has announced the addition of one more rocket to the production cycle as of 2013, which will add another three seats for tourists. Virginia-based Space Adventures, the only travel agency that has put tourists in space so far, continues to sell trips on Soyuz despite the dearth of capacity.

Orbital trips are not flights of fancy: While suborbital companies market space flights with three days of training, a Soyuz mission requires at least nine months of preparation, Hadfield says. Every ISS tourist has done hard time in Star City, Russia, where the 50-year-old cosmonaut-training facilities are far from the lap of luxury. As Hadfield describes it, "You're in spartan, austere conditions, studying all day, every day. And you have to function at a primitive level in another language." Orbital space tourists must be fitted for custom equipment, submit to physical exams ("A colonoscopy is also part of the astronaut experience," Hadfield says), and learn survival skills through rigorous simulations.

"The ISS is a vehicle that will kill you in an instant if you make a mistake, so it's not like hanging around the departure desk and just hoping you can jump on," Hadfield says. "It takes complex training, so what level of fantasy camp are you willing to commit to?"

Space Adventures sweetened its portfolio in 2005 by offering a trip to the moon's orbit, which has not been attempted since the last Apollo mission in 1972. To put this in perspective: Branson sells tickets for a spaceship that goes 63 miles into the sky, while the moon is more than 235,000 miles from the Earth's surface. One tourist has signed on to the moon mission for $150 million—but one more seat must be sold and the vehicle has yet to be built. If the $300 million booking is met, a moon fly-by could launch in three or four years, Space Adventures says.

Soyuz rockets (top) bring travelers to the International Space Station. The Lynx space plane (rendering shown) aims for shorter jaunts.

BOTTOM: MIKE MASSEE/XCOR AEROSPACE

When all of this happens—be it cruises around the moon or regular short hops past the Kármán line—Aldrin says space tourism is bound to have deep effects on how the public perceives human space flight. "It will focus a lot of attention on the whole idea of space exploration," he says. "Hell, that would mean we could have a tourist flying to the moon before a NASA astronaut or a Chinese taikonaut."

Tourists, in effect, would continue the legacy of the space pioneers who built an orbiting satellite capable of sustaining human life and stepped into the void to repair the Hubble Space Telescope. Space travel has changed how we view our place in the universe and returned countless scientific discoveries that altered our daily lives: cell phones, personal computers, Wi-Fi, weather reports, and MRIs, to name only a few.

In light of these very great leaps, space tourism looks like little more than a business plan for giving folks a peek at the Earth's curves. However, a profitable commercial market in space flight is a necessary next step for human exploration. And so, we will go. R

THE NEW SPACE RACE

HERE IS A look at the most promising contenders in the fledgling business of space-tourism, from suborbital short hops to the edge of space to long-haul orbital flights to the International Space Station and beyond.

SHORT HOPS

Virgin Galactic: SpaceShipTwo

With a charismatic founder (Sir Richard Branson), space vehicles designed by the winner of the 2004 Ansari X Prize, and $57 million in advance bookings, Virgin Galactic is considered the industry leader in suborbital space. The Pasadena, Calif., company is aiming for a first launch this year or next, from Spaceport America in New Mexico. A double-hulled airplane will ferry SpaceShipTwo 50,000 feet above the Earth, and then the six-passenger vessel will launch in midair, like a slingshot stone traveling three times the speed of sound. *$200,000, through accredited agents listed on www.virgingalactic.com*

Armadillo Aerospace: In development

The Caddo Mills, Texas–based team helmed by computer-game mogul John Carmack formed in 2000 and is developing a modular rocket system with capabilities for vertical takeoff and landing. Even without the rocket, almost 300 seats have been sold. *$102,000, through Space Adventures, www.spaceadventures.com; www.armadilloaerospace.com*

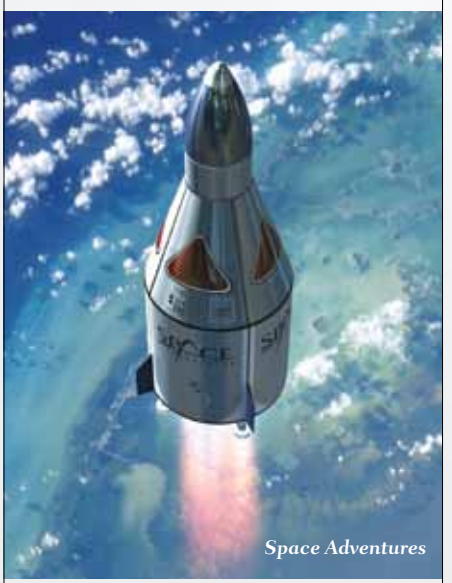
XCOR Aerospace: Lynx

The scrappy underdog of suborbital space travel, the Lynx rocket plane carries only one passenger and a pilot. XCOR plans its first commercial flight late this year from California's Mojave Air and Space Port and eventually plans to offer 20 flights per week. Orbital Outfitters will make spacesuits for the tourists, and the Arizona resort Sanctuary Camelback Mountain will host their training. *$95,000, through RocketShip Tours, www.rocketshiptours.com; www.xcor.com*

LONG HAULS

Space Adventures: Soyuz

Space Adventures is the only company with a rocket that can launch tourists into outer space—and the only company to actually do so, by brokering flights into low earth orbit on Russia's Soyuz spacecraft. The Vienna, Va.–based company says that last summer's Soyuz rocket failure will not delay its next project: a moon mission. *International Space Station flight, $50 million (plus $15 million to experience a spacewalk); Lunar mission, $150 million; www.spaceadventures.com*



Space Adventures

SpaceX: Dragon

Elon Musk's SpaceX is the first private company to have a vehicle successfully reenter the Earth's atmosphere from orbit. Musk says he is aiming to send a test flight to the International Space Station early this year, pending review by NASA. SpaceX, which is partially funded by NASA, has committed to selling seats to agency astronauts for a bargain $20 million. Tourism seems likely to follow. *www.spacex.com*

Sierra Nevada Corporation: Dream Chaser

The Dream Chaser space plane is based on NASA's designs for the HL-20 Personnel Launcher from the early 1990s. The Sparks, Nev., company's Dream Chaser program has received $105.6 million from NASA. *www.spacedev.com*

Blue Origin: In development

Amazon's Jeff Bezos has been secretive about his Blue Origin project, which has received NASA funding. But after an unmanned rocket went off course in the Texas desert last August, pictures of the malfunctioning suborbital launch vehicle were made public. NASA documents show that another vehicle, an orbital capsule, holds seven passengers and could be used for adventure trips or to destinations such as asteroids or the moon. *www.blueorigin.com*

Bigelow Aerospace: CST-100

Boeing has partnered with North Las Vegas startup Bigelow Aerospace, founded by the Budget Suites hotel billionaire Robert Bigelow. They are testing a mock capsule of the Crew Space Transportation (CST)-100 spacecraft, a project that is partially funded by NASA. Outside the partnership, Bigelow is also constructing a private space station—a project that sounds a lot like a space hotel. *www.bigelowaerospace.com* —S.R.