



Taking stock of the players in the second coming of the world's race to space



Probably the first thing you need to know about space if you're thinking about ponying up \$200,000 (or more) to go there is that it is not a hospitable place. Astronauts on space walks report that temperatures could swing from 120°C to -160°C—from scorching to frigid with the turn of a shadow. The torrents of matter and energy ejected from the sun as well as other celestial debris travel at speeds that are incomprehensible to us who are locked in the molasses of Earth's atmosphere. And then there's the vast empty darkness. Whatever it is people are referring to when they talk about an "indifferent" universe, well, you're swimming in it up there.

But it is also, by all accounts, life-changingly beautiful. The language of those who have seen the Earth from space bears greater resemblance to religious literature than to the scientific. The arbitrary borders that separate people and countries disappear, the time separating civilizations blurs together, and the oneness of the universe has a way of seizing you despite your efforts to avoid thinking about it in such clichéd terms. Jim Lovell, who flew on the Apollo 13 mission, said he knows what heaven is like because he was born there—which is to say, here, on Earth. When most astronauts invoke the word "heaven" they use it not in reference to the actual heavens, but to where we've come from.

All this helps explain the price tag for space tourism. It's not quite priceless but for most, it may as well be. The technology required to

travel there and back safely is, of course, considerably more specialized (read: expensive) than that of a commercial jetliner. But in the next decade or so, some of that may change.

Space tourism comes in three categories. The first frontier will be sub-orbital flights, in which the spacecraft passes temporarily above the Kármán line, the internationally recognized boundary about 100km above sea level where outer space begins. Selling features of these flights would include supersonic travel between two points on Earth, moments of weightlessness, and of course, the view. Virgin Galactic, the front-runner in the new commercial space race, has already sold more than 600 tickets and is currently running manned test flights. The company has also publicly said paying customers—first among them, Virgin's billionaire founder and playboy adventurer Richard Branson—could be taking trips before the end of the year. Other companies like Blue Origin, founded and owned by Amazon's Jeff Bezos, are not yet selling tickets, but its website does have a form to fill out for those

who'd like to "become an astronaut." It is also completing test flights.

The next frontier will be orbital flights, in which the spacecraft completes at least one revolution of the Earth out beyond the Kármán line. Beginning in 2020, the International Space Station (ISS), which sits somewhere between 300km and 450km above Earth, will begin to host paying space travellers who will be allowed to stay onboard for a maximum of 30 days for a modest \$35,000 per night. Because of cuts to our space programs, the Canadian Space Agency and NASA don't currently have the means to transport people or supplies to the ISS, and so have had to rely on the Russian Soyuz spacecraft. Now they've enlisted companies like SpaceX and Boeing to fill the gap. Boeing has announced there will be several reserved seats for paying space tourists onboard its Vulcan spacecraft when it begins to fulfill the terms of its contract in 2022.

That year is also the rather ambitious estimate for when our most talked-about visionary, Elon Musk, plans to conquer a more distant frontier: Mars. In 2017, Musk

announced that SpaceX's "Big Falcon Rocket," also known by its cheekier moniker "Big (expletive) Rocket," will complete an unmanned mission to Mars by 2022 and a manned mission by 2024.

Those predictions should bring into sharp contrast the hubris of some of these timelines, especially when you consider Musk's track record and that of space travel generally (Bezos of Blue Origin has wisely made very few promises). Today, only one company, Space Adventures, has successfully facilitated a commercial space journey. The first fare-paying space tourist was Dennis Tito who, in 2001, took a 10-day trip by Soyuz to the ISS for \$20 million (the advertised price for the trip was originally pegged between \$200 and \$250 million). The most recent was Guy LaLiberté, the Canadian founder of Cirque du Soleil, who paid a similar fortune for his visit in 2009. Only seven in total ever made the trip and none have gone in the last 10 years. However, Space Adventures apparently has one paying customer for a proposed Soyuz trip around the far side of the moon. That is expected to happen in about

a decade and the price tag is a reported \$100 million.

There were forerunners to these space tourists. In the 1980s, NASA opened programs for citizens who wanted to fly aboard the shuttle. Thousands applied for the Teacher in Space, Artist in Space, and Journalist in Space programs. Sadly, the programs were cancelled after the first teacher in space, Christa McAuliffe, was killed in the Challenger tragedy, marking the beginning of the end for America's prestigious space program. Even the private sector for space travel has been marred by dozens of broken promises and a handful of tragedies including the crash of a Virgin Galactic test flight in 2014.

The mood seems to be changing, though. With the successful launch and landing of reusable rockets (a massive leap forward for more cost-effective space travel), the technological outlook is growing more optimistic and the private investments continue to pour in. More importantly though, the astronomical sums people are willing to pay indicates that the pull that beckons us towards the stars is at least as strong as it ever was.

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