

their representatives in Congress. And several researchers point to industry as being likely to have the most clout. The Boulder area is home to a bustling quantum industry, and many of its employees come from NIST and JILA. “Industry is appalled,” says the physicist. “If industry chimes in, that could get more traction.”

## House letter unanswered

On 19 February, Zoe Lofgren (D-CA), the ranking member of the House Committee on Science, Space, and Technology, and fellow member April McClain Delaney (D-MD) wrote to Craig Burkhardt, acting undersecretary of Commerce for standards and technology and acting NIST director. The letter stated that the “rumored policy

change . . . would severely damage NIST’s ability to conduct cutting-edge research with world-class talent.” And Lofgren and Delaney blasted the organization for “secretive, slapdash policy changes that pull the rug out from visiting researchers.” The policy change, they wrote, would not only “be destabilizing for bright scientists who seek to bring their talents to the United States, it would have deleterious consequences on the country as a whole.”

In the letter, Lofgren and Delaney requested responses to questions about the existence of the NIST policy, how it was developed, how it’s been communicated, whether an appeals process has been established, and more. Specifically, they requested a briefing on the issue by 25 February. By the

end of that day, they had heard nothing from NIST.

Still, the letters and phone calls, publicity about the situation, and other pushback may be making a difference. The NIST physicist who commented on connections to industry says that on 24 February, senior management told scientists that decisions are not final. According to the physicist, the new understanding is that deadlines and restrictions may be open for discussion. That could mean exemptions for graduate students, for people from specific countries, or for those who work in certain research areas, the physicist says. “We interpret it as, We don’t have to kick people out the door,” they say. “No one really knows. But I would call this an improvement of sorts.”

PT

# Science inspires, but does not limit, Andy Weir’s fiction

Spreadsheets littered with calculations motivate the science-fiction writer’s stories, including *Project Hail Mary*.

By **Jenessa Duncombe**

*Editor’s note: This story contains minor spoilers about the plot of Project Hail Mary.*

**A**mount of fuel required. Mass of ship. Distance, in light-years, to destination. Those are some of the values in the Excel spreadsheet Andy Weir made when writing his 2021 novel, *Project Hail Mary*. The book centers on an astronaut who wakes up in a star system 12 light-years from Earth with little memory of how he got there. A series of misadventures follows. A movie adaptation hit theaters on 20 March.

Weir says he enjoys making his novels’ spreadsheets more than writing. “I set things in motion very specifically,” says Weir, who also wrote *The Martian* (2011) and *Artemis* (2017).

To generate story ideas, Weir muses about what-ifs and lets the answers determine whether the story is

worth telling. “I try to set up an interesting scenario and then just see where it goes,” he says. *The Martian* began with the question of how an astronaut could survive alone on Mars. Weir solved the problem iteratively, posting his drafts online for readers to weigh in. He created a spreadsheet to calculate launch windows according to orbital trajectory calculations. “If you say Sol 417, I could look it up in my spreadsheet and find the calendar date [in the story],” Weir says. The book and the 2015 movie earned praise for the realistic depictions of space engineering and the Martian environment.

In *Project Hail Mary*, a light-eating space microbe dims the Sun, which cools Earth’s surface by 6 to 8 degrees Celsius and throws the planet into an extinction-



▲ Ryland Grace, played by Ryan Gosling, must save Earth in the new film *Project Hail Mary*, based on the book of the same title. The movie's backdrop features realistic readouts calculated by author Andy Weir and the movie's science advisers. (Photo by Jonathan Olley.)

level event. The protagonist, Ryland Grace, could rescue Earth if he could remember who he is and how he got into space.

Weir tinkers with the story's numbers to devise the most-thrilling scenarios. "If I haven't defined enough of those starting conditions, then that means I get to go back and retroactively decide things," says Weir. He gives the example of adjusting the amount of fuel in Grace's spaceship to keep the story exciting.

A former software engineer, Weir consults websites for educators and students as sources for his science information. "I have a really tough time reading scholarly papers," he says. Although he knows scientists he could ask, he finds that Googling is a faster way to answer his questions. Science motivates Weir's stories, but he doesn't let it get in the way of a good plot. "If I don't like a fact, I change it," Weir says.

*Project Hail Mary* features a mixture of realistic, plausible, and fantastical scenarios. The ship at the heart of the story is "something that we *could* do with five or ten years and a few trillion dollars to play with," Alex Howe, an astrophysicist and science com-

municator who reviews science-fiction books, wrote on his blog.

The habitability of Venus's clouds is another plot point in the story, and that is an active area of research. In a paper published in *Nature Astronomy* in 2020, researchers claimed they had found evidence of phosphine gas in the clouds of Venus. Phosphine comes exclusively from biotic sources on Earth, and the authors stated that there is no known abiotic source on Venus. Several subsequent analyses of Venus data failed to find phosphine. Several missions to Venus by the mid 2030s are being considered.

One fictional exoplanet, Erid, at the heart of the story, was inspired by a nearby three-star system, 40 Eridani, that is the target of exoplanet searches. Catherine Clark, an astronomer who studies multistar systems, has studied the stars of 40 Eridani. No exoplanets have been confirmed there, says Clark, "but as a nearby bright star, 40 Eridani A is a good candidate for future planet searches."

On the more outlandish end of the spectrum, Weir invented the concept of "super cross-sectionality" to

explain how the space microbe stores energy. The movie summarizes the concept with a quip from Grace, played by Ryan Gosling, who says that the microbes “toot to scoot.” The film skims over many of the other science plot points that come up later in the book.

Weir crunched more numbers for the film. Much of the movie takes place on a spaceship, and the directors wanted realistic readouts on the ship’s screens. Weir calculated the distance of the ship to its destinations, the current velocity with respect to the target star, and other values depending on where a scene occurred. Weir says that a physicist on set would at times double-check his math and that NASA engineers reviewed cuts of the film. “They told us little things like, ‘Yeah, this is wrong, but it doesn’t matter.’ Or ‘This is wrong, and it does matter.’”

Having explicit math featured in his stories also opens it up for critique. One criticism, pointed out by readers online, is about the atmospheric pressure of the exoplanet Erid. In the book, Erid is said to have an air pressure 29 times as high as that of Grace’s spaceship. That is incorrect. What Weir meant is that Erid’s atmospheric pressure is 29 times as high as Earth’s at sea level—the spaceship’s internal air pressure is kept at 0.4 atmospheres. “It’s not perfect. I make mistakes,” Weir says. Changing the book in subsequent printings is harder than a simple find and replace, says Weir. “We just don’t bother making those changes.”

Weir acknowledges that the scientific scenarios he investigates aren’t novel in and of themselves. “I’m not even the first person to strand someone on Mars in fiction. I just like to do things my own way: meticulously, nerdishly, scientifically.” **PT**

# Eiffel Tower to gain symmetry with addition of women’s names

Women will join men in being honored on the Paris icon.

By **Toni Feder**



▲ Women scientists’ names are to be inscribed on the Eiffel Tower, as shown in this mock-up. They will be added above the names of men, who had to have made their scientific contributions in the century preceding the tower’s completion. The names face outward just below the first floor of the tower. (Image courtesy of Agence Pierre-Antoine Gatier, 2025.)