

**"I've been dreaming
about it... watching data
from Mars stream back
to Earth."**

— Tim Elam

The morning blastoff on 30 July marked the culmination of many years of exacting work for all involved with the Mars 2020 mission. *Perseverance*, a car-size rover, is now on its 300-million-mile journey to Mars, scheduled to touch down in February 2021. Aboard *Perseverance* is the Planetary Instrument for X-ray Lithochemistry—PIXL. Deployed on the rover's robotic arm, PIXL will be up front in the search for fossilized signs of Martian life preserved from billions of years ago.

Senior Principal Physicist Tim Elam got involved with the NASA team to develop PIXL nearly eight years ago. As the team's 'chief spectroscopist' Elam collaborated with engineers, geoscientists, and astrobiologists to design PIXL and integrate it with the rover's many science instruments. PIXL uses a powerful X-ray beam to scan a postage-stamp-sized area of rocks, zooming in to single grains of sand—about 100 microns. Analysis of the emission spectrum excited by the X-ray beam reveals the sample's chemical composition. "The thing that makes PIXL such a cool instrument is that it tells us both the composition and structure of materials—what elements are in different places," explains Elam. "These maps of the spectral distribution of elements are critical to detect biosignatures."

If there were microbes on Mars billions of years ago when rocks were being formed, PIXL will detect the chemical fingerprints left behind. To maximize chances of finding evidence of fossilized microbes, *Perseverance* will touch down in Jezero crater, which once held a lake and has well-preserved delta deposits left behind by outflowing water. When the rover begins exploration of the crater, PIXL will send data back to Elam and the team on Earth every Martian day. "I've been dreaming about it... watching data come down," says Elam. And each day, based on their analysis, the team will send a new set of commands that *Perseverance* will execute autonomously for the next daily cycle.

Elam had looked forward for many years to gathering with other members of the Mars 2020 mission team at Cape Canaveral for the launch. But because of the pandemic, he watched with his family at home. Still, the launch was a spectacular moment. Elam remembers exclaiming, "Wow! This thing is really going to Mars." He adds, "This is my first space mission. It's just as complicated, challenging, and exciting as I had imagined."

PIXL heads to Mars