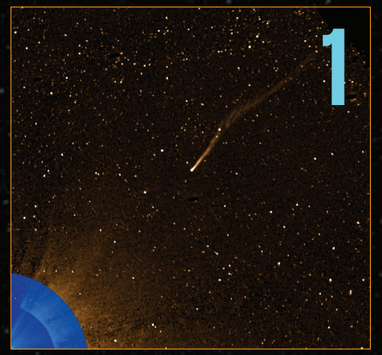
PUNCH

7 HIGHLIGHTS from YEAR 1

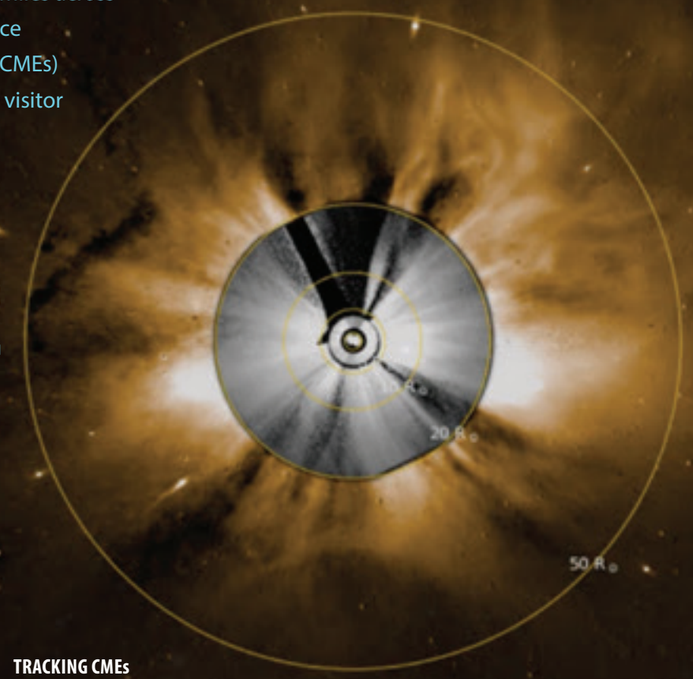
NASA's Polarimeter to Unify the Corona and Heliosphere, or PUNCH, spacecraft successfully maneuvered into their final science orbits about a year ago. The four SwRI-built suitcase-sized satellites are spread out in Earth's polar orbit and act as a single virtual instrument 8,000 miles across. From this unique perspective, PUNCH images a large swath of the inner solar system, with the goal of visualizing the solar corona, the Sun's outer atmosphere, as it transitions into the solar wind that fills and defines our solar system — plus so much more. PUNCH is led by SwRI's Dr. Craig DeForest.

PUNCH BY THE NUMBERS AS OF JULY 1, 2026

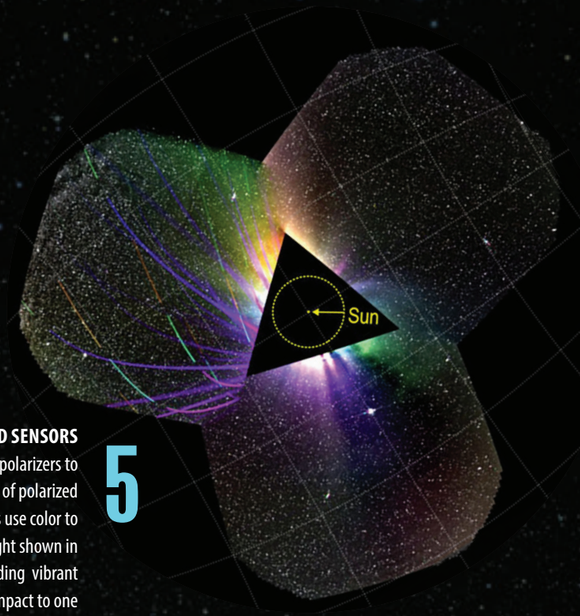
4 spacecraft create **1** virtual instrument **8,000** miles across
Downlinked **2** million images from space
Tracked over **200** coronal mass ejections (CMEs)
Observed **7** comets including **1** interstellar visitor



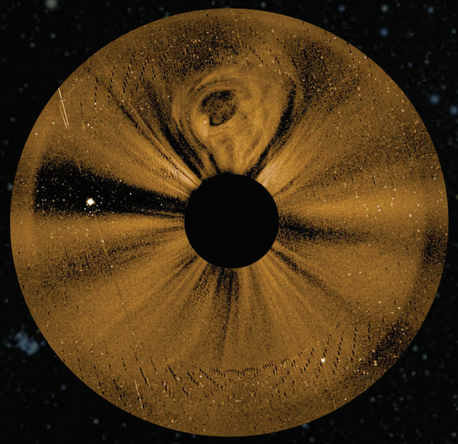
TWISTING TAIL PUNCH captured a rare event as turbulent gusts of the solar wind turned the smooth flowing tail of Comet Pan-STARRS into a twisting trail of evenly spaced, spinning knots of material. The unusual breakup and subsequent "vortex train" spanned roughly 8 million miles across the sky.



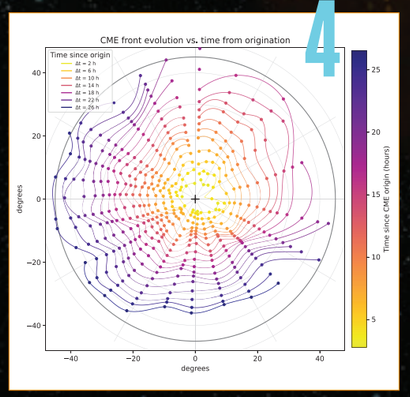
RADIATION CHARACTERIZATION PUNCH's gigantic field of view visually tracks solar storms moving through the solar system using new visualization tools. The Earth-directed coronal mass ejection picture here produced a modest radiation storm hours after Artemis II launched from Kennedy Space Flight Center on a historic return to lunar orbit.



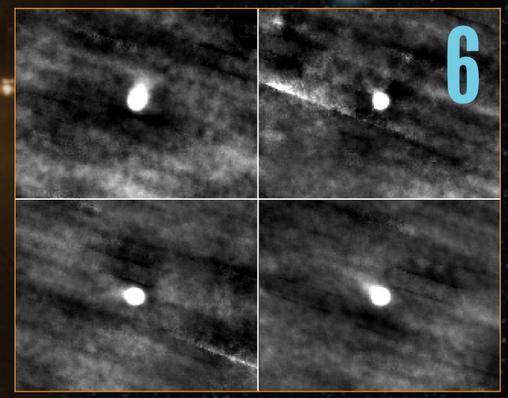
POLARIZED SENSORS Each PUNCH instrument uses three polarizers to measure the amount and direction of polarized light from the corona. Scientists use color to represent the polarization of the light shown in this colorful preliminary data, including vibrant fireworks associated with a debris impact to one satellite. Hue represents direction of polarization, and saturation represents degree of polarization.



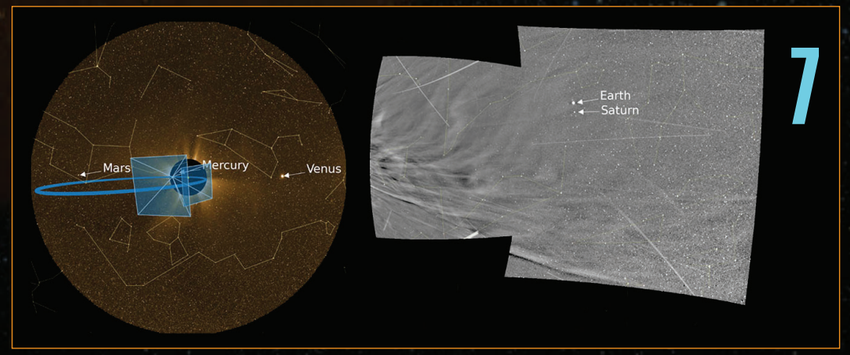
3 SOLAR EMISSIONS Before the constellation of satellites even completed commissioning, the mission's Narrow Field Imager captured early images of coronal mass ejections (top) erupting from the Sun.



TRACKING CMEs PUNCH's wide-field imaging will improve space weather forecasts of coronal mass ejections, which become invisible to most instruments once they leave the Sun — but not PUNCH. Scientists demonstrated how PUNCH can improve forecasts by retroactively predicting this CME's arrival at Earth (violet), using a simplified model of CME front evolution versus time of origination (yellow). The forecast nailed the arrival time, narrowing it to within 20 minutes of its actual arrival, as much as eight hours before it arrived at Earth.



IMAGING INTERSTELLAR INTERLOPER The PUNCH spacecraft tracked interstellar comet 3I/ATLAS for many weeks in Fall 2025 when, from Earth, it was behind the Sun and only "visible" to telescopes designed to look at the Sun. PUNCH continuously collected roughly one image per minute of 3I/ATLAS, visualizing the evolution of the tail and its interaction with the solar wind.



CELESTIAL STARING CONTEST The orbit (left blue ellipse) of NASA's Parker Solar Probe (PSP) is always in the PUNCH field-of-view (left), allowing joint studies of coronal and solar wind physics (PSP data, right). And three times a year, the spacecraft enter into a staring contest, as PSP and PUNCH look directly at each other for a few days.