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An Ancient Flare in Orion's Sword

The Discovery of the Brightest Stellar Flare Ever Recorded

Summary:

A team of researchers has just discovered the brightest stellar flare ever recorded using the James Clerk Maxwell Telescope (JCMT), located near the summit of Maunakea on the island of Hawaii. The brief flash of light occurred in the direction of a young, forming star known as "JW566" in the Orion Nebula. The flare carried a tremendous amount of energy, ten billion (10,000,000,000) times stronger than the regular solar flares we observe around our own Sun. The event itself took place over the course of only several hours nearly 1,500 years ago and it was captured by astronomy's coldest camera, known as SCUBA-2, on November 26th, 2016. The signal was only discovered in the data in August, 2018 by Hawaii-based astronomer, Dr. Steve Mairs, with the advent of sophisticated image analysis techniques that have been developed over the past 2 years. The flare is thought to be caused by a disruption in an intense magnetic field actively funnelling material onto the star as it gains mass from its surroundings and grows.

Using high-frequency radio telescopes like the JCMT to hunt for and analyse bright, short timescale events like flares around young stellar systems is a burgeoning field in astronomy. Observations of thousands of individual stars in their earliest stages of formation are beginning to unlock answers to decades-old questions while offering new, enchanting, images of stellar nurseries in our Milky Way Galaxy. The JCMT is the largest telescope in the world that is suited for these studies (and the only telescope capable of these observations in the northern hemisphere) that are changing our understanding of the origin of the Sun and planets and giving insight into how these celestial bodies are born.

The Team:

The JCMT Transient Survey team is an international collaboration of 80 astronomers led by Dr. Gregory Herczeg of Peking (Kavli Institute for Astronomy and Astrophysics) and Dr. Doug Johnstone (National Research Council of Canada). The team has been monitoring 8 star-forming regions in the Milky Way with a monthly cadence since December, 2015. Their survey will continue through January, 2020.

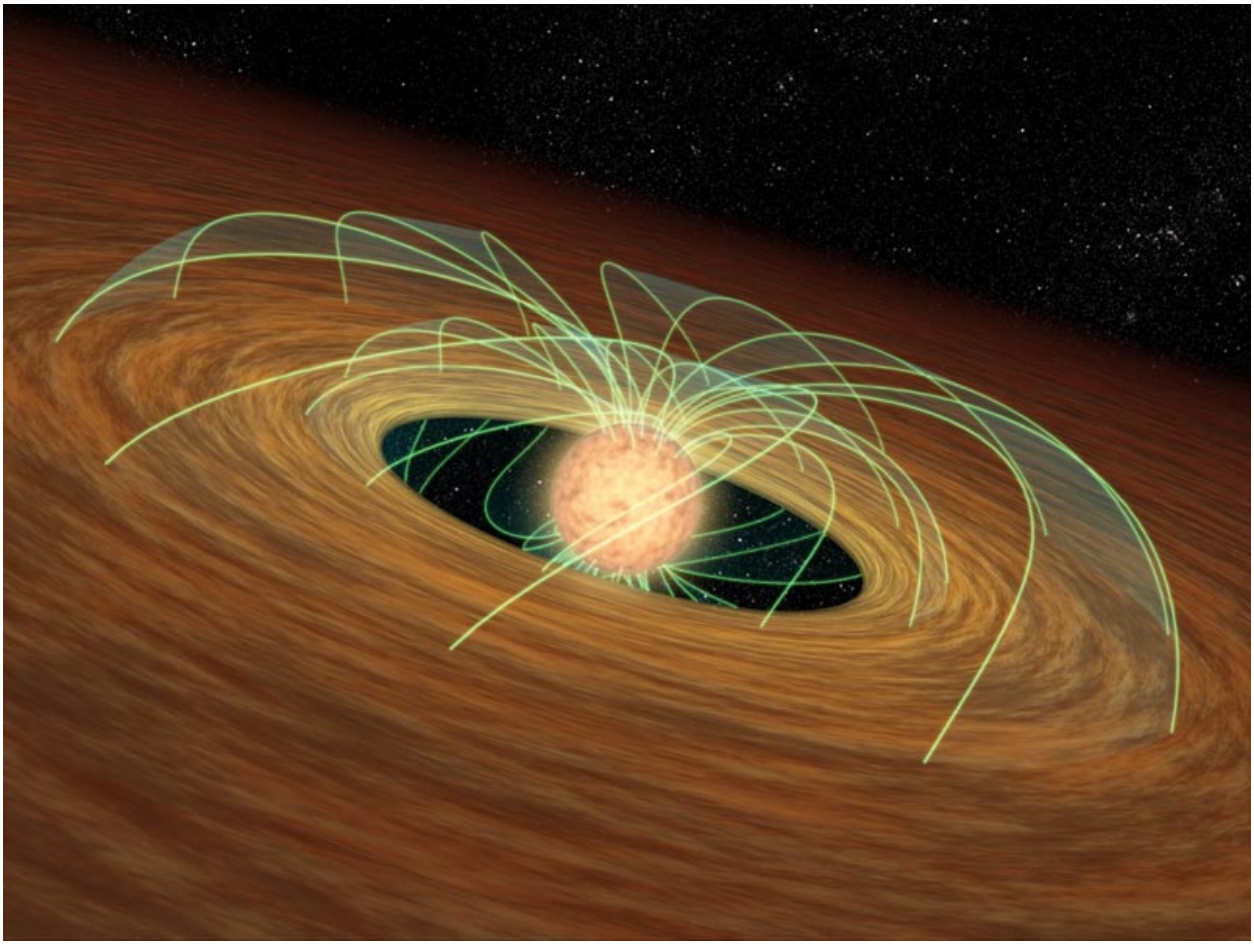
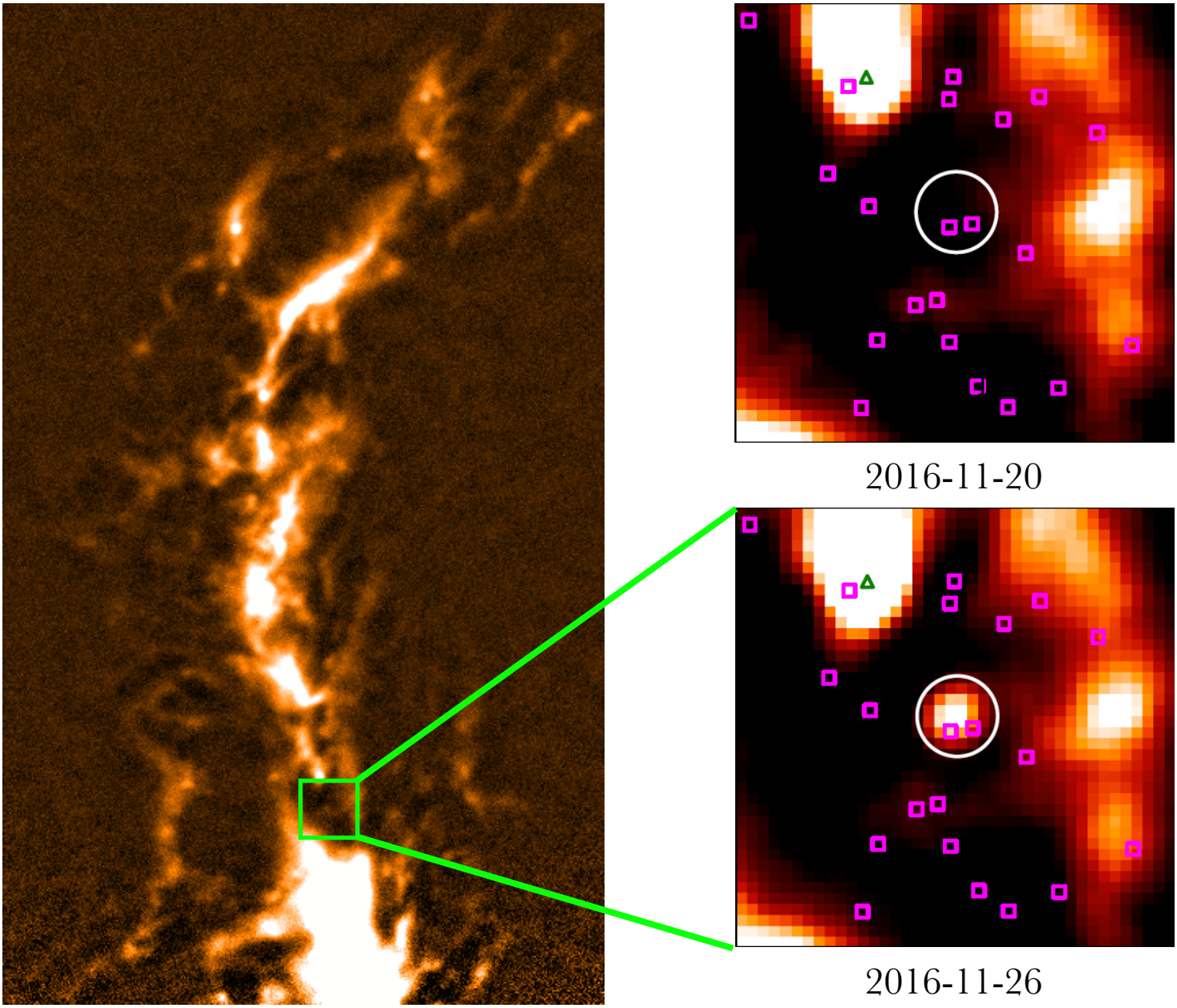


Image Credit: Jet Propulsion Laboratory (NASA). An artist's rendering of a disk of dusty, gaseous material that forms around young stars. Strong magnetic fields funnel material from this disk onto the central source. The twisting of the magnetic field lines from the rapidly spinning system can create energetic disruptions wherein material explosively carries energy away from the system over the course of minutes to hours. Leftover material in the disk after the formation of the star will eventually form planets that orbit the star.



Left: The Orion Nebula as seen by the James Clerk Maxwell Telescope. Right: Two images of the field surrounded by the green square taken 6 days apart. Small rectangles/triangles show the positions of known young stars found by other telescopes. On November 20th, 2016, there was no signal. On November 26th, 2016, the flare was observed while it was already dimming from its (unseen) maximum brightness. The dimming of the forming star was tracked for 30 minutes, during which it faded to half of its original brightness measured at the beginning of the observation.