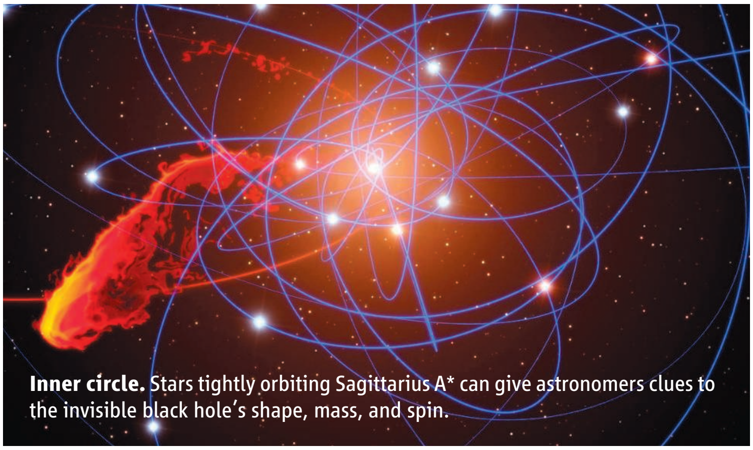
the near infrared. However, archival images recorded between 2008 and 2012 showed that G2 maintained an essentially uniform brightness, Gillessen and his colleagues reported on 1 February in *The Astrophysical Journal*.

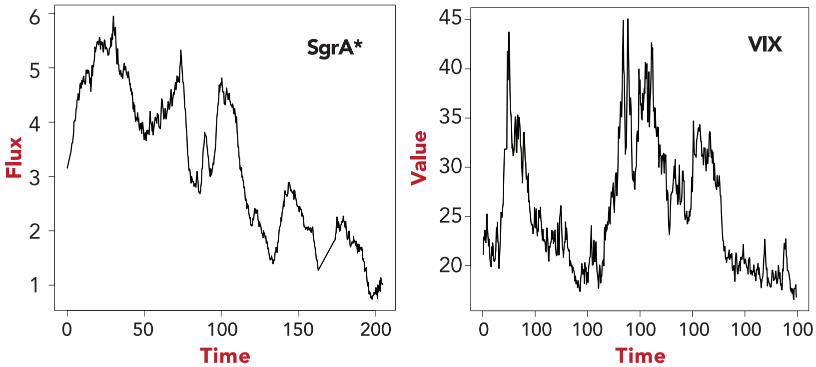
The discrepancy prompted Nick Scoville of the California Institute of Technology in Pasadena and Andreas Burkert of the Max Planck Institute for Extraterrestrial Physics and the University Observatory Munich to propose a new model. In a paper posted on the arXiv preprint server on 26 February (http://arxiv.org/abs/1302.6591), they suggest the gas is a steady wind blown out by a young star and that radiation from the star itself, not from its neighbors, ionizes the gas. Those properties explain G2's unchanging brightness as it heads ever closer to Sagittarius A*, the team says.



Inner circle. Stars tightly orbiting Sagittarius A* can give astronomers clues to the invisible black hole's shape, mass, and spin.

If G2 is held together by the gravity of a star, less material will detach at closest approach and fall onto Sagittarius A*. That could mean fewer fireworks during this go-round, although the star's gravity might keep the cloud intact for several more passages around the black hole, giving it additional opportunities to feed and revive the quiescent beast.

Exactly what astronomers will see also depends on just when the cloud arrives at Sagittarius A*. In some ways, later is better. Telescopes on Earth can't see the Milky Way's center between October and February, when our planet arcs through the part of its orbit that places Sagittarius A* on the far side of the sun. Orbiting telescopes, including NASA's Chandra X-ray Observatory, have a narrower blackout window: between November and January. G2 watchers will be disappointed if anything exciting happens during those times.



Bullish. UCLA researchers are modeling fluctuations in the infrared brightness of Sagittarius A* (*left*) using methods developed for studying the Standard & Poor's 500 stock market index (*right*).

Tracking the fireworks

Regardless of when G2 makes its closest approach, the light show is likely to unfold in three stages, Loeb says.

The first fireworks could erupt just as the gas makes its closest approach to the black hole, when the tidal gravitational forces from Sagittarius A* shred the gas into spaghetti-like filaments or droplets. X-ray emission will flare up if G2 continues to move at supersonic speed, producing a bow shock wave as it plows into the denser gas near the black hole, and should peak at closest approach, Loeb says.

The next phase could start a month or two later, when the shredded gas dives inward and strikes a proposed structure called the accretion disk—the swirling doughnut of matter believed to surround and feed the black hole. If the cool gas from G2 slams onto the warm disk, it could generate both x-rays and radio waves. Just how much radiation will be produced depends on the density, temperature, and extent of the disk—all unknown quantities at the moment, Loeb notes. "If we detect this brightening, we could constrain the unknown properties of the [accretion] disk for the first time," he says.

Timing how long the gas takes to travel to the disk may also shed light on conditions near the galactic center, says Avery Broderick of the Perimeter Institute for Theoretical Physics in Waterloo, Canada. By studying how G2 gives up its angular momentum to other gas parcels there, Broderick says, astrophysicists may be able to infer for the first time the viscosity of a gas or plasma far off in space—critical information for understanding the mechanism by which gas falls into and fuels a black hole.

Once the gas gets dumped onto the accretion disk, it could take several months to several decades for the remains of G2 to complete its death march, spiraling downward through the disk and disappearing forever inside the black hole's event horizon. A silent scream of radiation at all wavelengths, including x-rays, infrared light, and radio waves, may accompany its demise, although Loeb says that it may be hard to distinguish from emissions due to other processes that feed the black hole.

Several astronomers are worried that even the short-term effects of G2 may be tricky to tease out from the normal variability of Sagittarius A*. Though unusually dim, the black hole's accretion disk can sometimes generate a 10-fold increase in infrared light on a timescale of minutes. That flash of light is similar to the predictions of what G2's infall might produce. How can astronomers disentangle the impact of the gas cloud from the black hole's intrinsic fluctuations?

Leo Meyer, a member of Ghez's team, began pondering that question last spring while working with UCLA finance professor Francis Longstaff on methods to predict the behavior of Sagittarius A* using the same kind of time-series analyses used to forecast stock market volatility (see figure, left). "The big question now," Meyer says, "is whether the passage of G2 will lead to something like a stock market crash": a major change in the behavior of Sagittarius A* from an unusually dim bulb to a much more voracious, glowing black hole.

Until recently, astronomers were afraid that the black hole's natural mood swings might make such a transition hard to spot. Research had indicated that Sagittarius A* flipped between two distinct states: a quiescent low state and a high state marked by sharp outbursts of fluctuation. Such bipolar behavior could make it difficult to discern any brightening due to the impact of G2. But after a closer look at the

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