SCIENTIFIC AMERICAN
Space & Physics

New Quantum Restraints on Reality

AN EXPERIMENTAL TWIST ON THE SCHRÖDINGER'S CAT PARADOX COULD OVERTURN CHERISHED ASSUMPTIONS IN METAPHYSICS

Plus:

HOW MANY ALIENS ARE REALLY OUT THERE?

MISSION TO MARS: PERSEVERANCE

TIME'S ARROW MAKES MUSIC

WITH COVERAGE FROM nature

Ravi Kopparapu is a planetary scientist at NASA Goddard Space Flight Center who studies planetary habitability, climate modeling and chemistry in the context of exoplanet atmosphere characterization. He has authored nearly 50 peer-reviewed publications in scientific journals and book chapters. He can be reached on Twitter @ravi_kopparapu
Jacob Haqq-Misra is an astrobiologist who studies planetary habitability, the search for extraterrestrial life and the human settlement of Mars. He is a research scientist at the Blue Marble Space Institute of Science and has authored more than 50 peer-reviewed publications. You can find him on Twitter @haqqmisra or on his Web site.

POLICY & ETHICS

Unidentified Aerial Phenomena, Better Known as UFOs, Deserve Scientific Investigation

UAP are a scientifically interesting problem. Interdisciplinary teams of scientists should study them

People gather in Dexter, Mich., to watch for UFOs in 1966.

GETTY IMAGES

UFOs have been back in the news because of videos, initially leaked and later confirmed by the U.S. Navy and officially released by the Pentagon, that purportedly show "unidentified aerial phenomena" (UAP) in our skies. Speculations about their nature have run the gamut from mundane objects such as birds or balloons to visitors from outer space.

It is difficult, if not impossible, to say what these actually are, however, without context. What happened before and after these video snippets? Were there any simultaneous observations from other instruments or sightings by pilots?

A judgment on the nature of these objects (and these seem to be "objects," as confirmed by the navy) needs a coherent explanation that should accommodate and connect all the facts of the events. And this is where interdisciplinary scientific investigation is needed.

The proposal to scientifically study UAP is not new. The problem of understanding such unexplained UAP cases drew interest from scientists during the 1960s, which resulted in the U.S. Air

Force funding a group at the University of Colorado, headed by physicist Edward Condon, to study UAP from 1966 to 1968. The resulting Condon Report concluded that further study of UAP was unlikely to be scientifically interesting—a conclusion that drew mixed reactions from scientists and the public.

Concerns over the inadequacy of the methods used for the Condon Report culminated in a congressional hearing in 1968, as well as a debate sponsored by the American Association for the Advancement of Science (AAAS) in 1969, with participation by scholars such as Carl Sagan, J. Allen Hynek, James McDonald, Robert Hall and Robert Baker. Hynek was an astronomy professor at the Ohio State University and led the Project Blue Book investigation. McDonald, who was a well-known meteorologist and a member of the National Academy of Sciences and the AAAS, performed a thorough investigation of UAP. Sagan, a professor of astronomy at Cornell University, was one of the organizers of the AAAS debate. He dismissed the extraterrestrial hypothesis as unlikely but still considered the UAP subject worthy of scientific inquiry.

Recent UAP sightings, however, have so far failed to generate similar interest among the scientific community. Part of the reason could be the apparent taboo around UAP, which connects them to the paranormal or pseudoscience while ignoring the history behind them. Sagan even wrote in the afterword of the 1969 debate proceedings about the "strong opposition" by other scientists who were "convinced that AAAS sponsorship would somehow lend credence to 'unscientific' ideas." As scientists, we must simply let scientific curiosity be the spearhead of understanding such phenomena. We should be cautious of outright dismissal by assuming that all UAP must be explainable.

Why should astronomers, meteorologists or planetary scientists care about these events? Shouldn't we just let image analysts or radar observation experts handle the problem? All good questions, and rightly so. Why should we care? Because we are scientists. Curiosity is the reason we became scientists. In the current interdisciplinary collaborative environment, if someone (especially a fellow scientist) approaches us with an unsolved problem beyond our area of expertise, we usually do our best to actually contact other experts within our professional network to try to get some outside perspective. The best-case outcome is that we work on a paper or a proposal with our colleague from another discipline; the worst case is that we learn something new from a colleague in another discipline. Either way, curiosity helps us to learn more and become scientists with broader perspectives.

So what should be the approach? If a scientific explanation is desired, one needs an interdisciplinary approach to address the combined observational characteristics of UAP rather than isolating one aspect of the event. Furthermore, UAP are not U.S.-specific events. They are a worldwide occurrence. Several other countries studied them. So shouldn't we as scientists choose to investigate and curb the speculation around them?

A systematic investigation is essential to bring the phenomena into mainstream science. The collection of hard data is paramount to establishing any credibility to the explanation of the phenomena. A rigorous scientific analysis is sorely needed, by multiple independent study groups, just as we do to evaluate other scientific discoveries. We, as scientists, cannot hastily dismiss any phenomenon without in-depth examination and then conclude the event itself is unscientific.

Such an approach would certainly not pass the "smell test" in our day-to-day science duties, so these kinds of arguments similarly should not suffice to explain UAP. We must insist on strict agnosticism. We suggest an approach that is purely rational: UAP represent observations that are puzzling and waiting to be explained—just like any other science discovery.

The transient nature of UAP events, and hence the unpredictability of when and where the next event will happen, is likely one of the main reasons that UAP have not been taken seriously in science circles. But how can one identify a pattern without systematically collecting the data in the first place? In astronomy, the observations (location and timing) of gamma-ray bursts (GRBs), supernovae and gravitational waves are similarly unpredictable. We now recognize them, however, as natural phenomena arising from stellar evolution.

How did we develop detailed and complex mathematical models that could explain these natural phenomena? By a concerted effort from scientists around the world who meticulously collected data from each occurrence of the event and systematically observed them. We still cannot predict when and where such astronomical events will occur in the sky.

But we understand to an extent the nature of GRBs, supernovae and gravitational waves. Why? Because we have not dismissed the phenomena or the people who observed them. We studied them. Astronomers have tools, so they can share the data they collect even if some question their claim. Similarly, we need tools to observe UAP; radar, thermal and visual observations will be immensely helpful. We must repeat here that this is a global phenomenon. Perhaps some, or even most, UAP events are simply classified military aircraft or strange weather formations or other misidentified but mundane phenomena. Yet there are still a number of truly puzzling cases that might be worth investigating.

Of course, not all scientists need to make UAP investigation a part of their research portfolio. For those who do, discarding the taboo surrounding these phenomena would help in developing interdisciplinary teams of motivated individuals who can begin genuine scientific inquiry.

A template to perform a thorough scientific investigation can be found in McDonald's paper "Science in Default." Although he entertains the conclusion that these events could be extraterrestrial (which we do not subscribe to), McDonald's methodology itself is a great example of objective scientific analysis. And this is exactly what we as scientists can do to study these events.

As Sagan concluded at the 1969 debate, "scientists are particularly bound to have open minds; this is the lifeblood of science." We do not know what UAP are, and this is precisely the reason that we as scientists should study them.