Astrophysicist suggests light might be a problem for life on a planet orbiting a black hole

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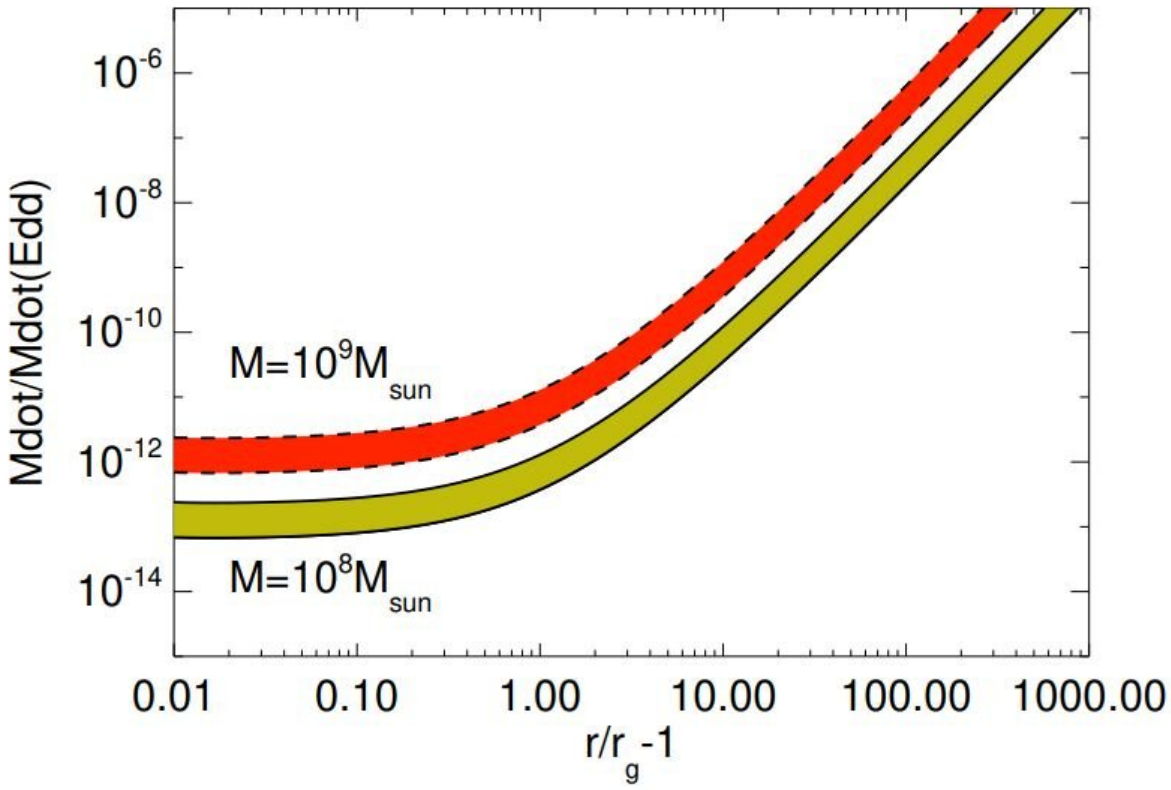

Habitable zone for planets embedded in a thin accretion disk around a Kerr black hole with a/M = 1 and mass 10^8 M⊙ (solid lines, yellow shading) and 10^9 M⊙ (dashed lines, red shading). Credit: arXiv:1910.00940 [physics.pop-ph]

Jeremy Schnittman, an astrophysicist at NASA's Goddard Space Flight Center has taken what he describes as a tongue-in-cheek look at the issues that might stand in the way of life existing on a planet orbiting a black hole. He has written a paper outlining his thoughts on the idea posted on the *arXiv* preprint server.

Space scientists are skeptical about the idea of life existing on a planet orbiting a black hole, mostly due to the likelihood that there would not be a star around to provide light and energy. Hollywood would beg to differ, however—the movie *Interstellar* showed astronauts (after traveling through a wormhole) checking out a dozen planets near a black hole as possible future homes for humans. After watching the movie, Schnittman decided to give some thought to the idea of habitable planets near black holes.

Schnittman notes that while there may not be a sun around to provide light and energy for life on such a planet, that may not be enough reason to rule out life existing in such a formidable place. He notes that black holes typically have accretion disks consisting of hot gas and other matter—such a disk could conceivably provide a planet with the light and energy for life to survive. But Schnittman notes that light would be affected by time shifting (as shown to dramatic effect in the movie)—the black hole would shift the light that reaches nearby planets to higher energies, which could be catastrophic to life. Such blue shifting would amplify all the light that reaches the planet, including harmful UV rays.

Schnittman notes that it is still not clear if planets could exist near a black hole, much less support life. But he further notes that thought experiments that focus on such things are good for science because they help scientists to think about the ways the universe works. Thus, even if the idea of sending astronauts to a planet near a black hole seems far-fetched, thinking about why could prove enlightening.

More information: Life on Miller's Planet: The Habitable Zone Around Supermassive Black Holes, arXiv:1910.00940 [physics.pop-ph] arxiv.org/abs/1910.00940