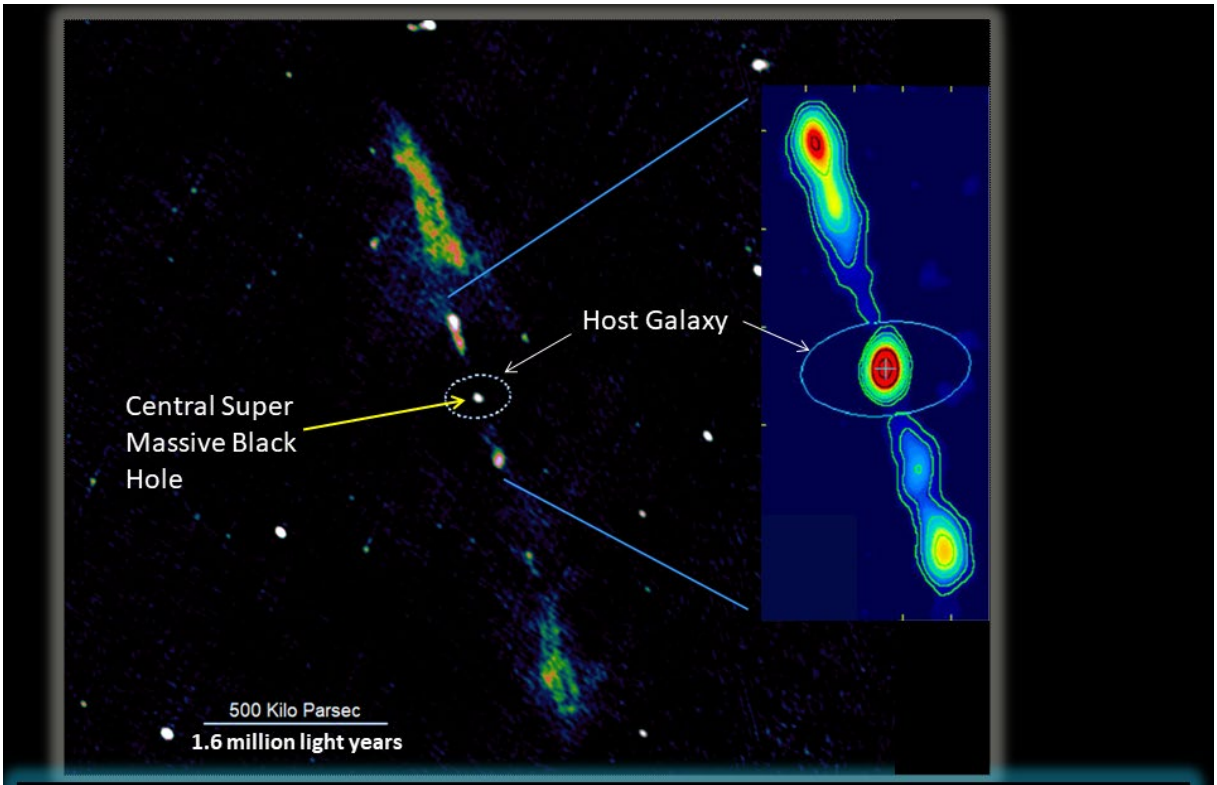
A Cosmic Paradox: Rare Spiral Galaxy Defies Scientific Expectations

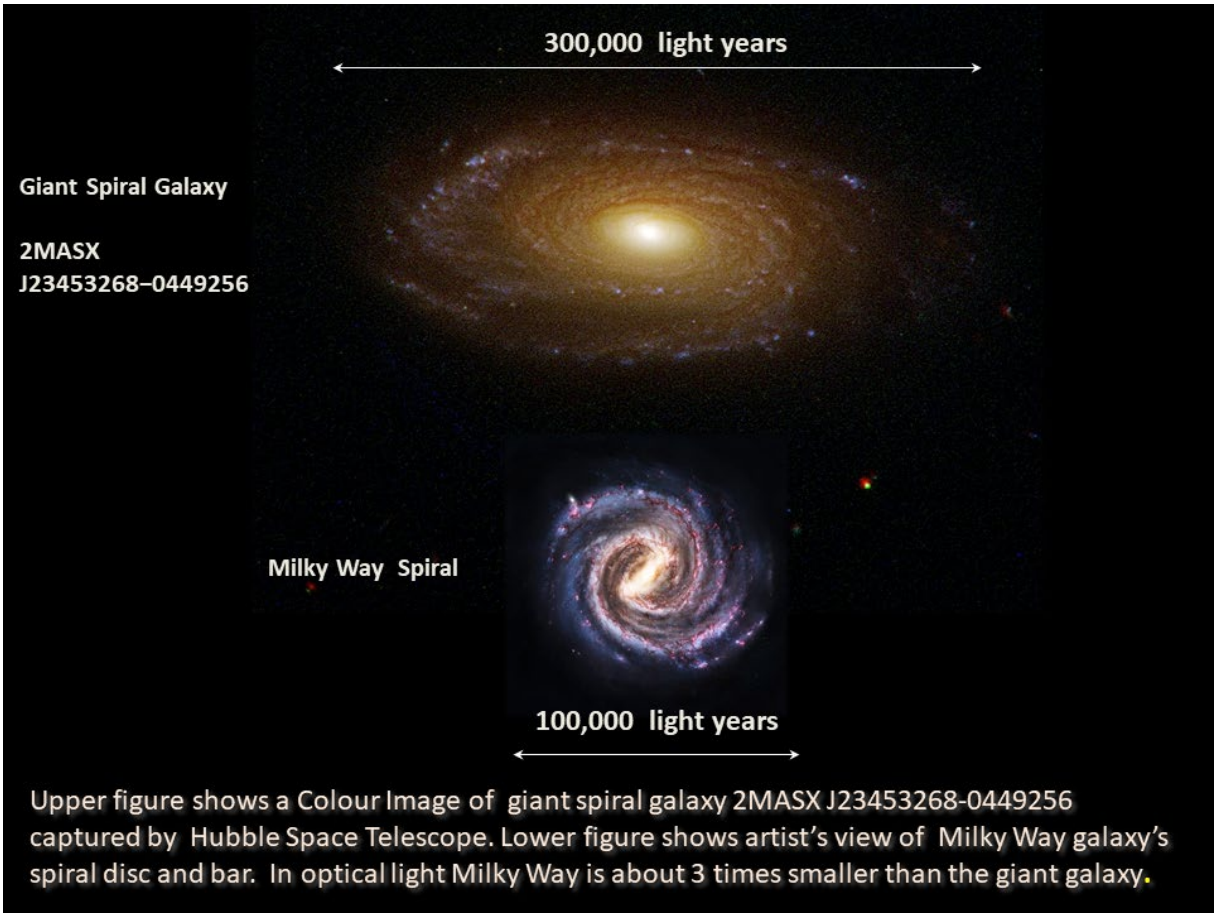
In a stunning breakthrough, researchers from CHRIST University, Bangalore—alongside an international team—have uncovered a cosmic anomaly that challenges our fundamental understanding of galaxy evolution. Their study, published in *MNRAS*, reveals that a massive spiral galaxy, 2MASX J23453268−0449256, located a billion light-years away, harbors a supermassive black hole billions of times the Sun's mass. Even more astonishing, this black hole powers colossal radio jets that stretch 6 million light-years—one of the largest known for any spiral galaxy.



Radio wave emitting giant jets (about 6 million light years long) ejected by the central supermassive black hole of host optical galaxy 2MASX J23453268−0449256 (oval shape), imaged by the Giant Metrewave Radio Telescope (GMRT) at 600 MHz are shown. The inset on right shows finer details of radio jets near the black hole.

This discovery upends conventional wisdom, as such powerful jets are almost exclusively found in elliptical galaxies, not spirals. Traditionally, scientists believed that the violent activity of colossal jets of supermassive black holes would disrupt the delicate structure of a spiral galaxy. Yet, against all odds, 2MASX J23453268−0449256 has retained its tranquil nature with well-defined spiral arms, a luminous nuclear bar, and an undisturbed stellar ring—all while hosting one of the most extreme black holes ever observed in such a setting.

Adding to the enigma, the galaxy is surrounded by a vast halo of hot, X-ray-emitting gas, providing key insights into its history. While this halo slowly cools over time, the black hole's jets act like a cosmic furnace, preventing new star formation despite the presence of abundant star-making material. Moreover, the galaxy possesses ten times more dark matter than the Milky Way, which helps stabilize its rapid spin despite the powerful forces at play.



Upper figure shows a Colour Image of giant spiral galaxy 2MASX J23453268-0449256 captured by Hubble Space Telescope. Lower figure shows artist's view of Milky Way galaxy's spiral disc and bar. In optical light Milky Way is about 3 times smaller than the giant galaxy.

Reference : Bagchi, J., Ray, S., Dhiwar, S., Dabhade, P., Barth, A., ; Ho, L. C. Mirakhor, M. S., Walker, S. A. , Nesvadba, N., Combes, F., Fabian, A., Jacob, J. : 2025, Unveiling the Bulge-Disc Structure, AGN Feedback, and Baryon Landscape in a Massive Spiral Galaxy with Mpc-Scale Radio Jets, MNRAS 538, 1628, arXiv:2405.01910