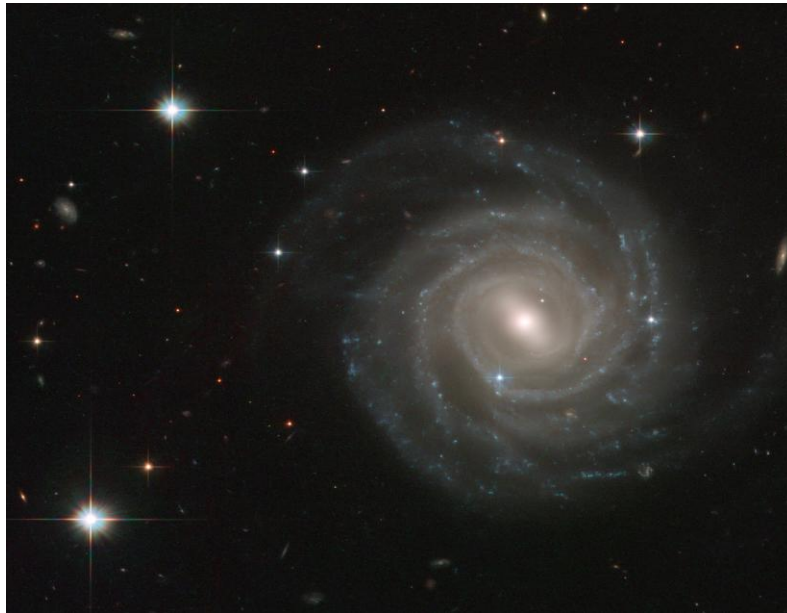


## PRESS RELEASE

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### Beyond the Edge of the Stars: New Clues About Dark Matter

**A new study shows that the Universal Rotation Curve extends far beyond the stellar disk, suggesting that visible matter and dark matter are linked much more deeply than previously thought. This finding also raises the possibility of the existence of a new dark matter particle, still unknown but capable of interacting with ordinary matter**



Trieste, 7 July 2026

The Universal Rotation Curve does not stop where the stars end. It continues into the most remote regions of spiral galaxies, where dark matter dominates. This is the finding of a study conducted by Paolo Salucci and collaborators at SISSA, together with Esha Bhatia of the Indian Institute of Technology, published in “Discover Space”. The research strengthens one of the leading models used to describe spiral galaxies and suggests that the relationship between visible matter and dark matter is much deeper than current models predict. According to the authors, this new picture could shed light on galaxy formation and provide fresh clues about the possible existence of a previously unknown dark matter particle capable of interacting with ordinary matter.

## **Inside the Mysteries of Spiral Galaxies**

Uncovering the mysterious nature of dark matter is undoubtedly one of the most ambitious goals of modern astrophysics. Spiral galaxies play a key role in this quest because they are particularly rich in this elusive, invisible component that emits no light. "Over the years," explains Paolo Salucci, "careful investigations have shown that, in spiral galaxies, stellar disks rotate around their centers according to a well-defined pattern known as the Universal Rotation Curve (URC). This curve reveals the physical properties of the dark matter halos surrounding the stellar disks. Yet many questions remain unanswered." To investigate the URC in greater detail, the researchers used the SPARC (Spitzer Photometry and Accurate Rotation Curves) database, which contains observations of approximately 150 spiral galaxies spanning a wide range of luminosities. The database provides the kinematics of rotating neutral hydrogen disks extending to distances at least twice the radius of the stellar disk, the main luminous component of these galaxies.

## **Dark Matter and Ordinary Matter: Unexpected Connections**

"The new study," the researchers explain, "builds upon the analysis of about 1,000 rotation curves derived from the kinematics of interstellar gas. The surprising result is that the parameters describing the distribution of luminous matter and those describing dark matter remain strongly correlated even in the outermost regions of galaxies. This is something that current standard models do not predict."

"Our results," says Tiziano Schiavone, another co-author of the study, "show that the remarkable universality of the rotation curves of spiral galaxies, previously observed within the stellar disk, persists out to distances twice as large."

This finding strengthens the Universal Rotation Curve paradigm, improving our understanding of mass distribution in spiral galaxies and providing new clues about the nature of dark matter. The new data continues to reveal tight correlations between the structural properties of luminous matter and those of dark matter—correlations that are not expected within the current standard framework for dark matter.

## **A New Dark Matter Particle?**

"The implications of these results are remarkable," says Sandeep Haridasu, another member of the research team. "The Universal Rotation Curve extends into the most remote, dark matter-dominated regions of spiral galaxies, revealing a striking cosmic pattern that could transform our understanding of galaxy formation and, ultimately, help uncover the nature of the dark matter particle."

Co-author Esha Bhatia concludes: "The intricate relationship emerging between the properties of luminous and dark matter strongly points to the existence of a new kind of dark matter particle, capable of interacting, on cosmological scales, with Standard Model particles such as atoms and their constituents, photons, and neutrinos."

If confirmed by future studies, these findings could require a substantial revision of the models currently used to describe dark matter and its role in the formation and evolution of galaxies.

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**IMAGE**

Credits: ESA/Hubble & NASA

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