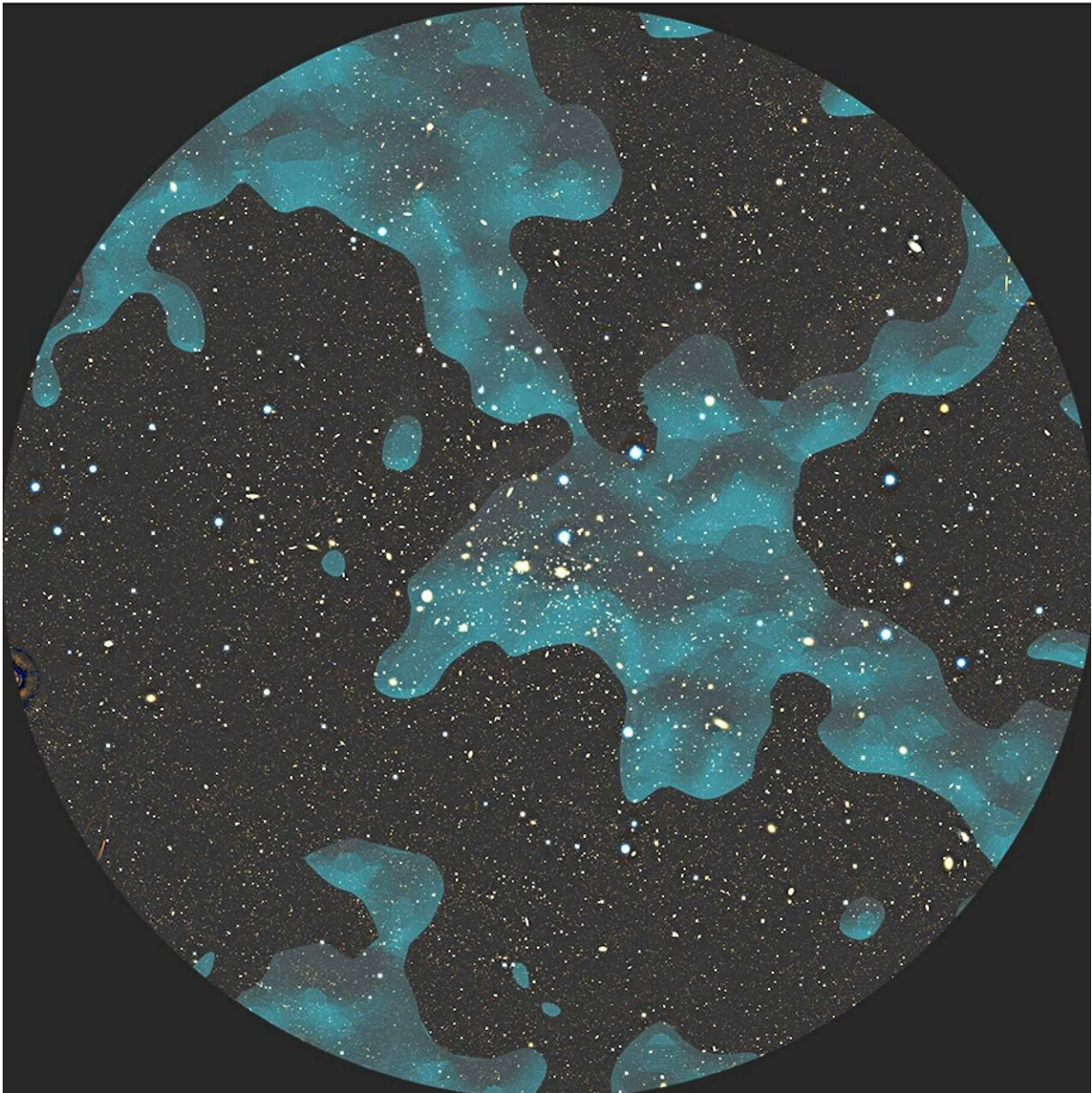


# Cosmic dark matter web detected in Coma cluster

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Dark matter in the Coma Cluster region. The distribution of dark matter calculated based on this research (dark green cloud) is overlaid on an image of the Coma Cluster and more distant background galaxies taken by the Subaru Telescope. Strands of dark matter can be seen extending millions of light years. Credit: HyeonHan et al.

The Subaru Telescope has spotted the terminal ends of dark matter filaments in the Coma cluster stretching across millions of light years. This is the first time that strands of the cosmic web spanning the entire universe have been directly detected. This provides new evidence to test theories about the evolution of the universe.

In the [solar system](#), we are used to seeing matter gathered into round objects like planets, moons, and the sun. But [dark matter](#), which accounts for most of the mass in the universe, is believed to exist as a web of long thin strands. But like a spider web, these strands can be hard to see, so astronomers have typically drawn conclusions based on observations of galaxies and gas stuck in the web. This is similar to how if you see a dead leaf that appears to hang in midair, you know there is a spider web that you cannot see.

A team of researchers from Yonsei University used the Subaru Telescope to look for direct signs of dark matter filaments in the Coma cluster, located 321 million [light-years](#) away in the direction of the constellation Coma Berenices. Their paper, "[Weak-lensing detection of intracluster filaments in the Coma cluster](#)" is published in *Nature Astronomy*.

The Coma cluster is one of the largest and closest galaxy clusters, making it a good place to look for faint signs of dark matter. Ironically, because it is so close, it also appears large, making it difficult to observe

the entire cluster.

The Subaru Telescope offers the right combination of high sensitivity, high resolution, and wide field of view, to make these observations possible. Through robust data analysis, the team identified the terminal segments of the invisible dark matter filaments attached to the Coma cluster.

This is the first time these strands have been confirmed directly, giving new evidence for the idea that dark matter webs stretch across the universe.

**More information:** Kim HyeongHan et al, Weak-lensing detection of intracluster filaments in the Coma cluster, *Nature Astronomy* (2024).

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Provided by Subaru Telescope

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