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Why the stars stay put

Two official stories, decades apart, about matter that should have flown away.

In 1933, Fritz Zwicky studied the Coma Cluster. In the 1970s, Vera Rubin watched the outer stars of spiral galaxies. Official pages say both were looking at the same kind of missing matter.

The official story	Official wording
Zwicky, 1933	Galaxies in the Coma Cluster "moved too quickly for the gravity created by its observed ordinary matter. The galaxies should have been escaping the cluster, but instead, they were staying together." He "dubbed this mysterious material 'dunkle Materie,' which is German for dark matter." Official pages add that the idea was still seen, then, as a fringe concept.
Rubin, 1970s	Stars on the outer edges of spirals "moved as fast as they did without flying into intergalactic space." "Rubin concluded that these galaxies must be held together by dark matter." Hubble's page later calls her the "mother of dark matter."
A vinyl record	Official wording compares real galaxies to "an old-fashioned vinyl record on a turntable." We expected, given only the light we can see, that the outer stars would lag. They do not.

A short quiz

1. In which year did Zwicky publish his Coma Cluster paper, according to NASA's Dark Matter page?
2. What did he call the missing material?
3. What official name does Hubble's page use for Vera Rubin?

Answers. 1933. Dunkle Materie — dark matter. The mother of dark matter.

Wording from NASA Science, Dark Matter, and NASA Science, Hubble Dark Matter, checked 18 November 2026. dark-matter.galaxies.im is independent of NASA and ESA. Typographic sheet: no photographs inside.