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ASTRONOMY

Dark-matter mystery: Its force can be seen, its source cannot

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"Dark matter" is a phrase that rolls trippingly from the tongues of astronomers these days. You simply cannot talk about galaxies or the universe without hearing it.

While dark matter is tantalizing stuff, it also is a source of embarrassment.

Astrophysicists go around breathlessly claiming that the universe is full of it — and in the same gasp acknowledge that they have no idea what it is. That leaves some to wonder who is full of it.

For decades, evidence has been accumulating for a strong influence of gravity in places where there isn't enough visible mass to produce it. In galaxies, we see stars and interstellar clouds orbiting too fast to be held in place by the gravity of the galaxies' visible matter.

In giant clusters of galaxies, the galaxies themselves would escape into intergalactic space if only the visible mass held them inside.

And these clusters couldn't have clustered in the first place in the 14-billion-year history of the universe without extra gravity to draw them together.

Using the term "dark matter" to describe material of unknown nature that produces gravity without emitting or absorbing light goes back at least to 1918, when Sir Arthur Eddington wrote that the speeds of stars orbiting around the center of our Milky Way depended on the amount of dark matter it contained.

But Eddington wasn't anticipating today's situation. For most of the 20 th century, "dark matter" meant the stuff that we now call interstellar dust, which is easily seen in dark clouds, blocking the light of stars behind them.

So when evidence for extra gravity started piling up in the 1970s, most astronomers called it "missing mass." This prompted complaints that the mass wasn't missing at all. What was missing was our ability to find it.

And that's the current state of affairs. We can observe the gravitational influence of dark matter. We just can't see it directly.

Astronomers and physicists hope that this embarrassment will point the way to major discovery.

This hope isn't baseless. The original missing-mass problem dates back to 1846, when the quirky orbit of Uranus seemed to suggest the gravitational influence of an unseen mass. The result: the discovery of Neptune.

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