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# How to See the Invisible: 3 Approaches to Finding Dark Matter

Physicists scour heaven, Earth, and everywhere in between for the mysterious particles that hold together galaxies and sculpt the universe.

By Lisa Randall | Wednesday, February 22, 2012

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### Dark Matter Observatories

The third way to detect dark matter is through indirect detection in the sky or on Earth. Dark matter is dilute, but nonetheless dark particles might sometimes collide and annihilate, releasing energy and other particles in the process. Annihilation doesn't happen enough to significantly affect the overall density, but it might be enough to produce a measurable signal. Depending on its nature, dark matter annihilation could sometimes yield detectable particles and antiparticles, such as electrons and positrons, or pairs of photons.

The instruments that search for these products of dark matter annihilation were conceived as telescopes or detectors to look at particles and photons emitted by galaxies and the exotic objects that lie within them. But such observations might also illuminate the nature of dark matter. Since antimatter particles are relatively rare in the universe and since the distribution of photon energies could exhibit distinctive and identifiable properties, such detections could eventually be associated with dark matter. The spatial distribution of these particles might help distinguish dark matter annihilation products from more common astrophysical backgrounds.

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