

# Dark matter and galaxies part ways in collision between hefty galaxy clusters

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Credit: NASA, ESA, CFHT, CXO, M.J. Jee (University of California, Davis), and A. Mahdavi (San Francisco State University)

(Phys.org)—This composite image shows the distribution of dark matter, galaxies, and hot gas in the core of the merging galaxy cluster Abell 520, formed from a violent collision of massive galaxy clusters that is located about 2.4 billion light years from Earth.

Data from NASA's Chandra X-ray Observatory show the hot gas in the

colliding clusters colored in green. The gas provides evidence that a collision took place. Optical data from NASA's [Hubble Space Telescope](#) and the Canada-France-[Hawaii Telescope](#) (CFHT) in Hawaii are shown in red, green, and blue. Starlight from galaxies within the clusters, derived from observations by the CFHT and smoothed to show the location of most of the galaxies, is colored orange.

The blue-colored areas pinpoint the location of most of the mass in the cluster, which is dominated by dark matter. Dark matter is an invisible substance that makes up most of the universe's mass. The dark-matter map was derived from the Hubble observations, by detecting how light from distant objects is distorted by the [cluster galaxies](#), an effect called gravitational lensing. The blend of blue and green in the center of the image reveals that a clump of dark matter (which can be seen by mousing over the image) resides near most of the hot gas, where very few galaxies are found.

This finding confirms previous observations of a dark-matter core in the cluster [announced](#) in 2007. The result could present a challenge to basic theories of dark matter, which predict that galaxies should be anchored to dark matter, even during the shock of a powerful collision.

**More information:** Jee, M. et al, 2012, *ApJ* 747, 96. [arXiv:1202.6368](#)

Provided by Chandra

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