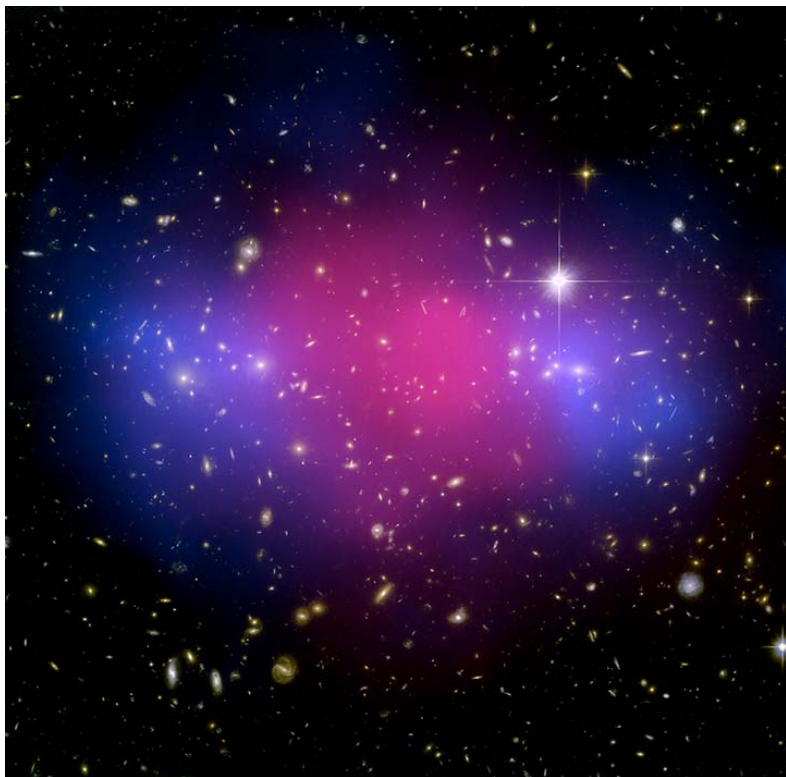




Chandra Science Highlight

MACS J0025.4-1222: A MASSIVE MERGING GALAXY CLUSTER REVEALS SEPARATION OF DARK AND ORDINARY MATTER



Chandra X-ray Observatory ACIS image.

Scale: Image is 3.2 arcmin across.

Estimated Distance: About 5.6 billion light years.

This image shows two subclusters of galaxies merging at high speeds. The distribution of ordinary matter, mostly in the form of hot gas, is shown in pink, and the distribution of total mass – mostly dark matter – is shown in blue. The galaxies are shown in white and cyan.

- The total mass distribution was determined using an analysis of strong (highly distorted arcs) and weak (weakly distorted background galaxies) gravitational lensing.
- The fraction of total mass in hot gas and galaxies is 9 percent and 1 percent, respectively. Ninety percent of the mass is in the form of dark matter.
- The distribution of hot (~70 MK) gas is mapped by Chandra, and seen to be clearly displaced from the distribution of galaxies and dark matter, showing that the dark matter must have a very small collision cross section.
- The observed separation of dark and ordinary matter severely challenges models that seek to explain effects attributed to dark matter in terms of a modification of the Newtonian law of gravity.

Reference: M. Bradac et al, 2008, *Astrophys. J.*, Accepted: also arXiv:0806.2320

Credit: X-ray (NASA/CXC/Stanford/S.Allen);
Optical/Lensing(NASA/STScI/UC Santa Barbara/M.Bradac)