

NASA's flagship mission for X-ray astronomy.



- [Home](#)
- [About Chandra](#)
- [Education](#)
- [Field Guide](#)
- [Photo Album](#)
- [Press Room](#)
- [Resources](#)
- [Multimedia](#)
- [Podcasts](#)
- [Blog](#)
- [Research](#)

Images by Date

2021	2020	2019	2018
2017	2016	2015	2014
2013	2012	2011	2010
2009	2008	2007	2006
2005	2004	2003	2002
2001	2000	1999	

Images by Category

[Solar System](#)
[Stars](#)
[White Dwarfs](#)
[Supernovas](#)
[Neutron Stars](#)
[Black Holes](#)
[Milky Way Galaxy](#)
[Normal Galaxies](#)
[Quasars](#)
[Galaxy Clusters](#)
[Cosmology/Deep Field](#)
[Miscellaneous](#)

Images by Interest

[Space Scoop for Kids](#)
[4K JPG](#)
[Multiwavelength](#)
[Sky Map](#)
[Constellations](#)
[Photo Blog](#)
[Top Rated Images](#)
[Image Handouts](#)
[Desktops](#)
[Fits Files](#)

Image Tutorials

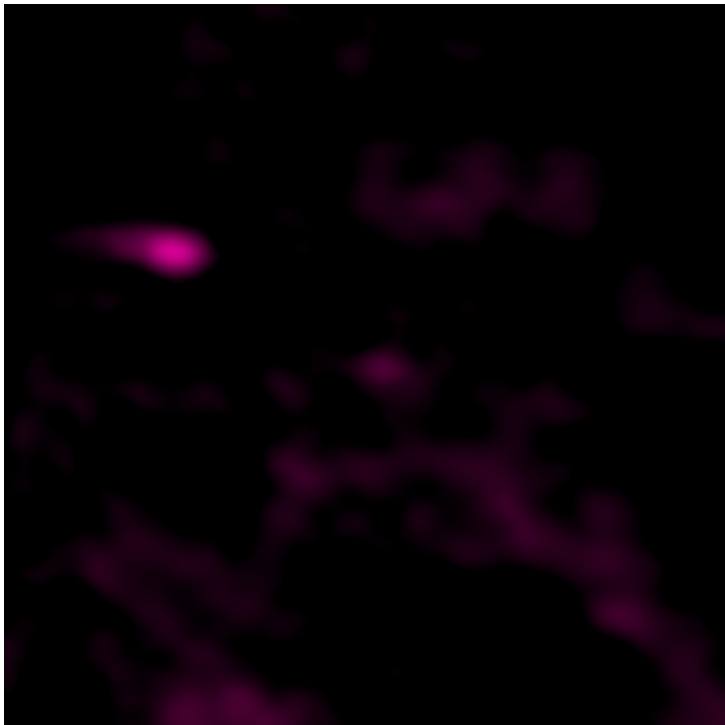
[Photo Album Tutorial](#)
[False Color](#)
[Cosmic Distance](#)
[Look-Back Time](#)
[Scale & Distance](#)
[Angular Measurement](#)
[Images & Processing](#)
[AVM/Metadata](#)

[Image Use Policy](#)

Web Shortcuts

[Chandra Blog](#)
[RSS Feed](#)
[Chronicle](#)
[Email Newsletter](#)
[News & Noteworthy](#)
[Image Use Policy](#)
[Questions & Answers](#)
[Glossary of Terms](#)
[Download Guide](#)
[Get Adobe Reader](#)

MACS J1149.5+2233: A Fusion of Galaxy Clusters



View Wavelengths [Composite](#)[X-ray](#)[Optical](#)[Radio](#)

- The Frontier Fields is a project that combines long observations from multiple telescopes of galaxy clusters.
- Galaxy clusters contain up to thousands of galaxies and vast reservoirs of hot gas embedded in massive clouds of dark matter.
- Data from Chandra, Hubble, Spitzer and other telescopes are part of the Frontier Fields project.
- This Frontier Fields galaxy cluster, known as MACS J1149.5+2233, is located about 5 billion light years from Earth.

MACS J1149.5+2233 (MACS J1149 for short) is a system of merging galaxy clusters located about 5 billion [light years](#) from Earth. This [galaxy cluster](#) was one of six that have been studied as part of the "Frontier Fields" project. This research effort included long observations of galaxy clusters with powerful telescopes that detected different types of light, including [NASA's Chandra X-ray Observatory](#).




Astronomers are using the Frontier Fields data to learn more about how galaxy clusters grow via collisions. Galaxy clusters are enormous collections of hundreds or even thousands of galaxies and vast reservoirs of hot gas embedded in massive clouds of [dark matter](#), invisible material that does not emit or absorb light but can be detected through its gravitational effects.

This new image of MACS J1149 combines [X-rays](#) from Chandra (diffuse blue), optical data from Hubble (red, green, blue), and radio emission from the Very Large Array (pink). The image is about four million light years across at the distance of MACS J1149.

The Chandra data reveal gas in the merging clusters with temperatures of millions of degrees. The optical data show galaxies in the clusters and other, more distant, galaxies lying behind the clusters. Some of these background galaxies are highly distorted because of [gravitational lensing](#), the bending of light by massive objects. This effect can also magnify the light from these objects, enabling astronomers to study background galaxies that would otherwise be too faint to detect. Finally, the structures in the radio data trace enormous shock waves and turbulence. The shocks are similar to sonic booms, and are generated by the mergers of smaller clusters of galaxies.

NASA's Marshall Space Flight Center in Huntsville, Alabama, manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, controls Chandra's science and flight operations.

Fast Facts for MACS J1149.5+2233:

Credit	X-ray: NASA/CXC/SAO; Optical: NASA/STScI; Radio: NSF/NRAO/AUI/VLA
Release Date	October 31, 2017
Scale	Image is 3.2 arcmin across (about 4.7 million light years)
Category	Groups & Clusters of Galaxies
Coordinates (J2000)	RA 11h 49m 36.3s Dec 22° 23 ' 58.1"
Constellation	Leo
Observation Date	8 pointings between Jun 2001 and Feb 2015
Observation Time	101 hours 30 min (4 days 5 hours 30 min)
Obs. ID	1656, 3589, 16238, 16239, 16306, 16582, 17595, 17596
Instrument	ACIS
Color Code	X-ray (Blue); Optical (Red, Green, Blue); Radio (Pink)
	  
Distance Estimate	About 5 billion light years



Visitor Comments (0)



The Basics

[What is it?](#)

[How Far Away is it?](#)



In the constellation Leo.

Rate This Image

Rating: **3.8**/5
(311 votes cast)

Download & Share

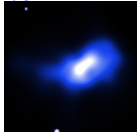
[JPEG \(719.4 kb\)](#)
[Large JPEG \(13.8 MB\)](#)
[Tiff \(28.3 MB\)](#)
[Handout \(pdf\)](#)
[Image Feed](#)

Share This  

More Images





X-ray Image of MACS
J1149.5+2233
[Jpg](#), [Tif](#)



[More Images](#)

Related Images



 [Abell 2744](#)
(22 Jun. 2011)

[6 Galaxy Clusters](#)
(26 Mar. 2015)

Related Information



**Groups & Clusters of
Galaxies**

[X-ray Astronomy Field Guide](#)
[Questions and Answers](#)
[Chandra Images](#)

Related Podcast



[Quick Look: On the Hunt for
a Missing Giant Black Hole](#)





Data Sonification



Data Sonification



Uranus

[Help](#) | [Site Map](#) | [Image Use Policy](#) | [Privacy](#) | [Accessibility](#) | [Downloads & Plugins](#) | [Glossary](#) | [Q & A](#) | [New & Noteworthy](#) | [CXC Science](#)

Chandra X-ray Center, Operated for NASA by the Smithsonian Astrophysical Observatory
This site was developed with funding from NASA under contract NAS8-03060.

Contact us: cxcpub@cfa.harvard.edu
Harvard-Smithsonian Center for Astrophysics
60 Garden Street, Cambridge, MA 02138 USA
Phone: 617.496.7941 Fax: 617.495.7356



Select Language

Powered by Google Translate

[Tweet](#)

Like 324K

