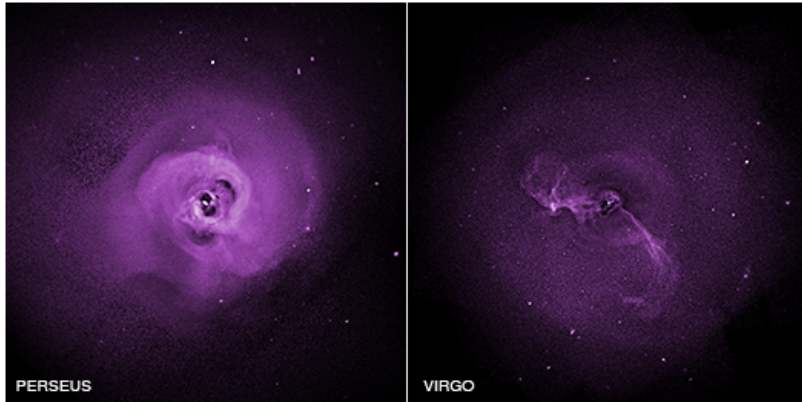




# Chandra Science Highlight

## Perseus Cluster and Virgo Cluster: Turbulent Heating in Galaxy Clusters



### Scale:

Perseus Cluster: Image is 20 arcmin across (about 1.5 million light years).

Virgo Cluster: Image is 22 arcmin across (about 320,000 light years)

### Distance Estimate:

Perseus: 250 million light years

Virgo: 55 million light years.

Broadband (0.5-3.5 keV) Chandra X-ray images of the Perseus Cluster and Virgo Cluster.

- ❑ The hot (10 MK – 100 MK) X-ray emitting intracluster medium (ICM) is the dominant baryonic component of galaxy clusters.
- ❑ In the cores of many clusters, the radiative cooling time of the hot gas is significantly less than the age of the system.
- ❑ If unchecked, radiative cooling could lead to the accumulation of large amounts of cool gas and vigorous star formation, in contradiction with observations.
- ❑ Chandra observations of the density fluctuations in the hot gas in the Perseus and Virgo cluster suggest that turbulent heating generated by a central supermassive black hole may balance the cooling.

**Reference:** Zhuravleva, I. et al, 2014, Nature (in press)

**Credit:** X-ray: NASA/CXC/Stanford/I.Zhuravleva et al.

**Instrument:** Chandra ACIS Observation

**CXC Operated for NASA by the  
Smithsonian Astrophysical Observatory**



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