

Make your own XMM-Newton bookmark! Just cut out each side and glue or tape them together.



UV



X-ray

### A Multiwavelength View of the Universe

The spiral galaxy M81 (NGC 3031), in the constellation Ursa Major, is made up of billions of stars and is situated some 12 million light-years away. M81 is easy to observe with a small telescope or binoculars.

The UV and X-ray images show light produced by very hot and powerful objects. The two images are made by different instruments on the XMM-Newton satellite and highlight different aspects of the galaxy. The left-hand picture combines three ultraviolet images from the Optical Monitor telescope in which blue indicates hotter emission and red indicates cooler emission.

The bluish-white spots are regions along the spiral arms where new stars are being formed.

The right-hand picture was taken with the X-ray cameras on XMM-Newton and bright areas show regions of X-ray emission. The active galactic nucleus is visible at the center of the galaxy, and the X-ray emission is powered by gas falling into a massive black hole. Other bright spots of X-ray emission are produced by X-ray binary stars and supernova remnants. The rays that seem to be emanating from the nucleus of the galaxy are an artifact of the X-ray camera.

For more information visit the XMM-Newton educational website at <http://outreach.ucsb.edu/xmm> or [http://heasarc.gsfc.nasa.gov/docs/xmm\\_1c/](http://heasarc.gsfc.nasa.gov/docs/xmm_1c/)



## XMM-NEWTON MISSION

The XMM-Newton satellite, named for its X-ray Multi-Mirror design and for Isaac Newton, investigates the energetic processes of the universe by recording images and spectra of very hot celestial objects. From this information, astronomers can learn more about the elemental composition of these hot objects and the processes of stellar and galactic evolution.

XMM-Newton is an ESA (European Space Agency) mission with NASA instrumentation and support. Launched from Kourou, French Guiana on December 10, 1999, the satellite is now returning impressive scientific results. XMM-Newton has observed the most distant quasars ever detected, found unexpected radiation escaping from a spinning black hole, and discovered new variable stars.

XMM-Newton is about the size of a schoolbus and carries instruments which can observe the universe in X-ray, ultraviolet, and optical wavelengths. It orbits the Earth every 48 hours, reaching a maximum distance equal to one-third of the distance to the Moon.

The XMM-Newton Education and Public Outreach program is designed to inform the public and the educational community about XMM-Newton and its scientific discoveries. Program elements include:

- educational materials designed for secondary science classrooms
- educator workshops at regional and national science teacher meetings
- a website with information for educators and non-scientists about X-ray astronomy, the mission, and XMM-Newton's discoveries
- an extended educator workshop held during the summer
- classroom visits from XMM-Newton team members

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