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## X-rays

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Also known as the Roentgen ray. Named after Wilhelm Roentgen their discoverer, for which discovery he received the first Nobel prize. X-rays have been central to many Nobel prize discoveries, notably the 2002 prize in Physics, awarded to Riccardo Giacconi for his contributions towards the discovery of cosmic X-ray sources.

X-rays are photons of energies greater than  $\sim 0.1$  keV and less than  $\sim 511$  keV. This corresponds to wavelengths shorter than 120 Angstroms and longer than 0.025 Angstroms. Photons of lower energy do not penetrate more than 100 pc through our Galaxy, due to photoelectric absorption. (Einstein got the Nobel prize for explaining why this is.) Photons of  $\sim 511$  keV or higher can produce electron-positron pairs, or arise from nuclear reactions. They are called Gamma-rays.

X-ray focusing optics normally work in the energy range less than 10 keV, although special multi-layer coatings using interference effects can produce focusing up to 10 keV. Chandra's HRMA works up to 10 keV.

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<http://cxc.harvard.edu/ciao3.4/dictionary/xray.html>  
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