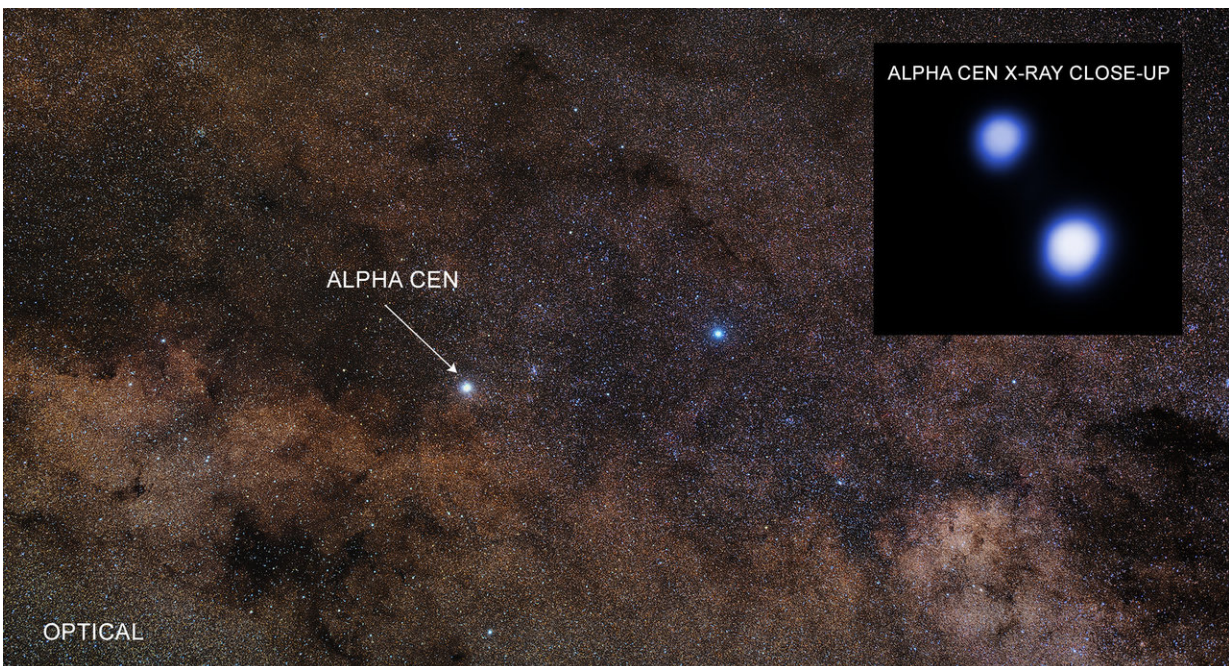


Chandra scouts nearest star system for possible hazards

June 7 2018, by Megan Watzke



Credit: X-ray: NASA/CXC/University of Colorado/T.Ayres; Optical: Zdeněk Bardon/ESO

In humanity's search for life outside our Solar System, one of the best places scientists have considered is Alpha Centauri, a system containing the three nearest stars beyond our Sun.

A new study that has involved monitoring of Alpha Centauri for more

than a decade by NASA's Chandra X-ray Observatory provides encouraging news about one key aspect of planetary habitability. It indicates that any [planets](#) orbiting the two brightest [stars](#) in the Alpha Cen system are likely not being pummeled by large amounts of X-ray radiation from their host stars. X-rays and related Space Weather effects are bad for unprotected [life](#), directly through high radiation doses and indirectly through stripping away planetary atmospheres (a fate thought to have been suffered by Mars in our own Solar System).

Alpha Centauri is a triple star system located just over four light years, or about 25 trillion miles, from Earth. While this is a large distance in terrestrial terms, it is much closer than the next nearest Sun-like stars.

"Because it is relatively close, the Alpha Centauri system is seen by many as the best candidate to explore for signs of life," said Tom Ayres of the University of Colorado Boulder. "The question is, will we find planets in an environment conducive to life as we know it?"

The stars in the Alpha Centauri system include a pair called "A" and "B," (AB for short) which orbit relatively close to each other. Alpha Cen A is a near twin of our Sun in almost every way, including age, while Alpha Cen B is somewhat smaller and dimmer but still quite similar to the Sun. The third member, Alpha Cen C (also known as Proxima), is a much smaller red dwarf star that travels around the AB pair in a much larger orbit that takes it more than 10 thousand times farther from the AB pair than the Earth-Sun distance. Proxima currently holds the title of the nearest star to Earth, although AB is a very close second.

The Chandra data reveal that the prospects for life in terms of current X-ray bombardment are actually better around Alpha Cen A than for the Sun, and Alpha Cen B fares only slightly worse. Proxima, on the other hand, is a type of active [red dwarf star](#) known to frequently send out dangerous flares of X-ray radiation, and is likely hostile to life.

"This is very good news for Alpha Cen AB in terms of the ability of possible life on any of their planets to survive radiation bouts from the stars," said Ayres. "Chandra shows us that life should have a fighting chance on planets around either of these stars."

While one remarkable Earth-size planet has been discovered around Proxima, astronomers continue to search, without success, for exoplanets around Alpha Cen A and B. Planet-hunting around these stars has proved more difficult recently due to the orbit of the pair, which has drawn the two bright stars close together on the sky over the past decade.

To help determine whether Alpha Cen's stars are hospitable to life, astronomers have run a long-term campaign in which Chandra has observed the system's two main stars about every six months since 2005. Chandra is the only X-ray observatory capable of resolving AB during its current close orbital approach, to determine which star is doing what.

These long-term measurements have captured the complete ups and downs of the X-ray activity of AB, analogous to the Sun's 11-year sunspot cycle. They show that any planets in the habitable zone for A would receive a lower dose of X-rays, on average, than similar planets around the Sun. For companion B the X-ray dose for habitable zone planets is higher than for the Sun, but only by a factor of about five.

In comparison planets in the [habitable zone](#) around Proxima receive an average dose of X-rays about 500 times larger than the Earth, and 50,000 times larger during a big flare.

Besides illuminating the possible habitability of Alpha Cen's planets, Chandra's X-ray history of AB plays into theoretical explorations of our own Sun's cyclical X-ray activity. Understanding this is a key to cosmic hazards such as Space Weather, which can impact the technology-laden civilization right here on our home world.

Tom Ayres presented these results at the 232rd meeting of the American Astronomical Society meeting in Denver, Colorado, and some of these results were published in January 2018 in the *Research Notes of the American Astronomical Society*.

More information: T. R. Ayres. Alpha Centauri Beyond the Crossroads, *Research Notes of the AAS* (2018). [DOI: 10.3847/2515-5172/aaa88f](https://doi.org/10.3847/2515-5172/aaa88f)

Provided by Chandra X-ray Center

Citation: Chandra scouts nearest star system for possible hazards (2018, June 7) retrieved 26 April 2024 from <https://phys.org/news/2018-06-chandra-scouts-nearest-star-hazards.html>

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