

Lyra

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Lyra is a constellation in the northern celestial hemisphere known for its prominent star Vega, one of the brightest stars in the sky. Represented as a lyre, a musical instrument from Greek mythology, Lyra is rich in celestial objects. Lyra is bordered by Vulpecula to the south, Hercules to the west, Draco to the north, and Cygnus to the east.

astronomy

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1. Introduction

Lyra, a constellation in the northern celestial hemisphere, is renowned for its distinctive shape and prominent star Vega. Represented as a lyre, a stringed musical instrument from Greek mythology, Lyra holds a significant place in cultural and astronomical history. Positioned between the constellations of Hercules and Cygnus, Lyra spans approximately 18 to 19 hours of right ascension and 30 to 40 degrees of declination (**Figure 1**), making it easily visible from mid-northern latitudes during the summer months.

Characterized by its brightest star Vega, Lyra boasts several notable celestial objects, including multiple double stars, variable stars, and deep-sky objects. Vega, with an apparent magnitude of 0.03, stands out as one of the brightest stars in the night sky and serves as a reference point for navigation and observation. Its spectral type A0V indicates that it is a relatively young, hot, and luminous star, making it a popular target for astronomers studying stellar evolution.

In addition to Vega, Lyra is home to the famous Ring Nebula (M57), a planetary nebula located approximately 2,300 light-years from Earth. This iconic object, formed from the remnants of a dying star, showcases a luminous ring of gas and dust surrounding a white dwarf star at its center. The Ring Nebula's distinctive appearance and relative proximity make it a popular target for amateur astronomers and astrophotographers.

Furthermore, Lyra contains several other deep-sky objects, including open and globular star clusters, nebulae, and galaxies, offering astronomers a rich tapestry of celestial phenomena to explore.

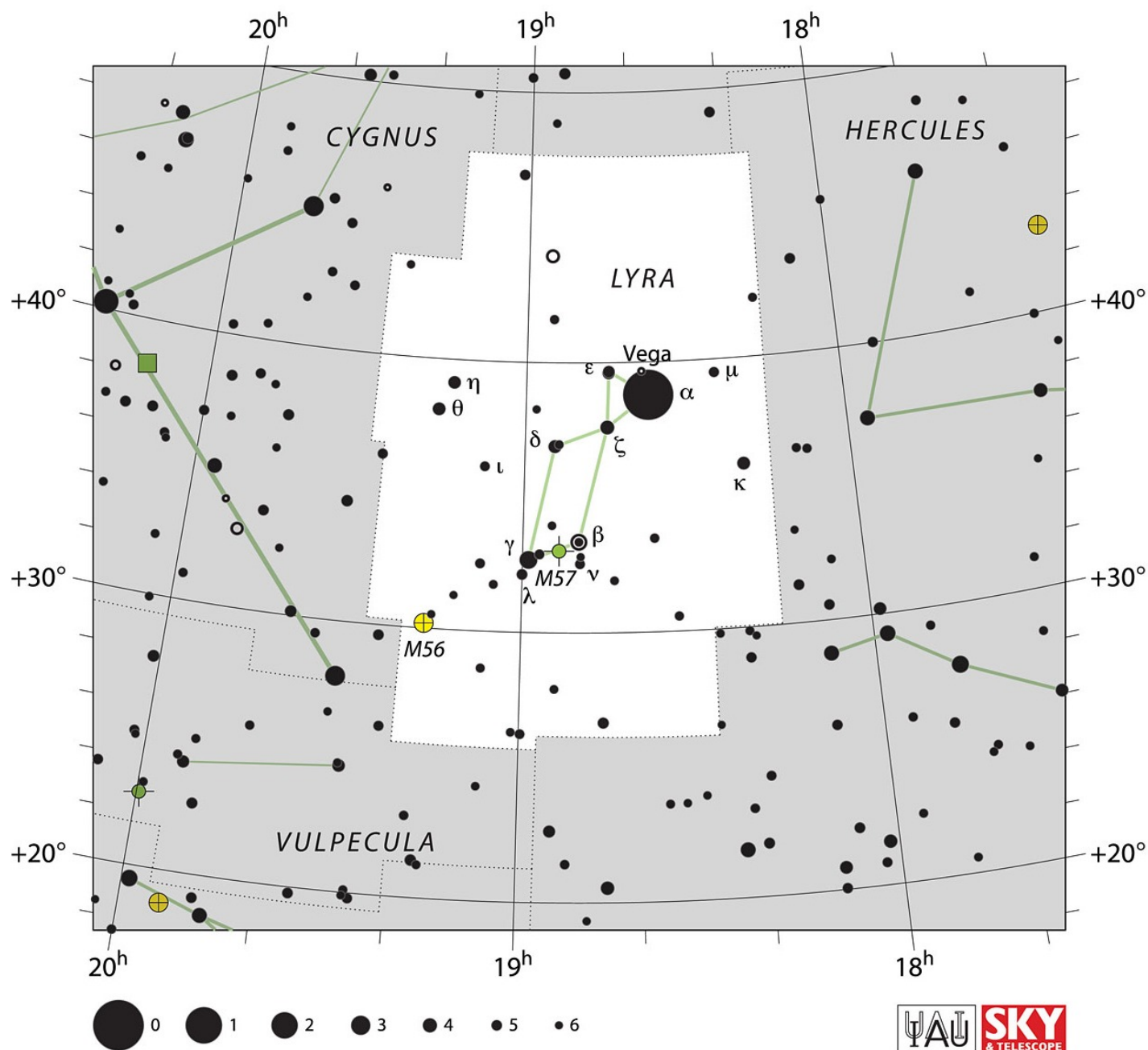


Figure 1. IAU chart of Lyra. Source: <https://www.iau.org/static/archives/images/screen/lyr.jpg>. Credit: IAU and Sky & Telescope. Reproduced under CC BY 4.0 license.

2. Historical Background and Mythology

Lyra, the celestial lyre, holds a rich historical and mythological significance dating back to ancient civilizations. Throughout history, this constellation has been associated with music, poetry, and storytelling, inspiring numerous myths and cultural interpretations.

In Greek mythology, Lyra is often linked to the legendary musician Orpheus, who was said to have possessed extraordinary musical talents. According to myth, Orpheus was gifted a lyre by the god Apollo and became renowned for his ability to charm both mortals and gods with his enchanting melodies. One of Orpheus' most famous exploits involved using his lyre to accompany his journey to the underworld in an attempt to rescue his beloved wife, Eurydice, from the clutches of death. The lyre, symbolizing the power of music and creativity, became closely associated with Orpheus and his mythological legacy.

In another mythological interpretation, Lyra is linked to the story of the tragic lovers Orpheus and Eurydice. After Eurydice's untimely death, Orpheus, grief-stricken and inconsolable, wandered the earth playing mournful melodies on his lyre. His sorrowful music was said to have moved the heavens and the earth, compelling even the rocks and trees to weep in sympathy. The lyre, as an emblem of Orpheus' musical prowess and emotional expression, became a symbol of love, loss, and the enduring power of art.

Beyond Greek mythology, Lyra's association with music and poetry is evident in various cultural traditions. In ancient Mesopotamia, the constellation was associated with the Sumerian deity Ninsun, often depicted holding a musical instrument resembling a lyre. In ancient Egypt, Lyra may have been linked to the harp of the goddess Hathor, symbolizing music, joy, and the afterlife.

In astronomical history, Lyra holds significance as the home of Vega, one of the brightest stars in the sky. In ancient times, Vega served as a prominent navigational marker for sailors and travelers, guiding them on their journeys across the seas and deserts. Its importance in navigation is reflected in its name, derived from the Arabic word "waqi," meaning "falling" or "swooping," referring to its position near the celestial pole.

3. Notable Stars

Vega, the brightest star in the constellation Lyra and the fifth brightest star in the entire night sky, holds a special place in both astronomical and cultural contexts. With an apparent magnitude of 0.03, Vega is visible from most locations on Earth and is particularly prominent in the northern hemisphere during the summer months. Vega's prominence is not only due to its brightness but also to its proximity to Earth. Located approximately 25 light-years away, Vega is relatively close compared to many other stars in the night sky. This proximity allows astronomers to study Vega in detail, providing valuable insights into its properties and characteristics.

Vega is classified as a main-sequence star of spectral type A0V, indicating that it is a relatively young, hot, and luminous star. With a surface temperature of around 9,600 Kelvin, Vega emits most of its light in the blue and ultraviolet parts of the spectrum, giving it a blue-white coloration. Its luminosity is approximately 40 times that of the Sun, making it one of the most luminous stars within 25 light-years of Earth.

One of the most intriguing aspects of Vega is its status as a pole star. Due to the Earth's axial precession, Vega will become the North Star in approximately 12,000 years, replacing Polaris as the closest bright star to the north

celestial pole. This role as a pole star adds to Vega's cultural significance and historical importance in navigation and celestial observation.

Another notable star in Lyra is Beta Lyrae, also known as Sheliak. Beta Lyrae is a binary star system consisting of two stars orbiting closely around each other. Classified as an eclipsing binary, Beta Lyrae exhibits periodic variations in brightness as the two stars eclipse each other from our perspective on Earth. The primary star in the system is a blue-white main-sequence star, while the secondary star is believed to be a larger, cooler star nearing the end of its life cycle. Beta Lyrae's variability and binary nature make it an intriguing target for amateur astronomers interested in observing eclipsing binaries and studying stellar dynamics.

Delta Lyrae, also known as Delta1 and Delta2 Lyrae, is another interesting star system in the constellation. Delta1 Lyrae is a multiple star system consisting of three components, while Delta2 Lyrae is a binary star system. Delta1 Lyrae features a close pair of stars orbiting each other, with a third star orbiting the pair at a greater distance. Delta2 Lyrae consists of two stars orbiting each other in a relatively close binary system. Both Delta1 and Delta2 Lyrae are relatively faint compared to Vega and Beta Lyrae but are notable for their multiple and binary star configurations, providing valuable insights into stellar dynamics and evolution.

4. Deep-Sky Objects

One of the most famous deep-sky objects in Lyra is the Ring Nebula, also known as Messier 57 (M57). This planetary nebula, located approximately 2,300 light-years away from Earth, is the result of a dying star shedding its outer layers and forming a glowing ring of gas and dust. At its center lies a white dwarf star, the remnant of the original star's core. The Ring Nebula's distinctive appearance and relative proximity make it a popular target for amateur astronomers and astrophotographers, offering a stunning example of stellar evolution in action.

Another notable deep-sky object in Lyra is the globular cluster Messier 56 (M56). Located approximately 32,900 light-years away, M56 is one of the oldest known globular clusters in the Milky Way galaxy. It contains hundreds of thousands of stars densely packed together by gravity, forming a spherical cluster that dates back billions of years. M56's relatively high distance from Earth makes it challenging to observe in detail, but its ancient age and stellar population offer valuable insights into the early history and formation of our galaxy.

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