NEOWISE-Comet

You can see Comet NEOWISE this month. Here's what we know about it
Ashley Strickland-Profile-Image
By Ashley Strickland, CNN

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NEOWISE comet is now visible from Earth. Don't miss it!
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NEOWISE comet is now visible from Earth. Don't miss it! 00:50
(CNN)Stargazers in the Northern Hemisphere should enjoy every opportunity to see the new Comet NEOWISE as it streaks across the evening sky for the rest of July.

Once it disappears from view, the comet will not be visible in Earth's skies for another 6,800 years, according to NASA.
While July began with the comet visible low on the horizon in the early morning sky, NEOWISE has now transitioned to become an evening comet, perfectly visible as the skies darken.
It's named after NASA's Near-Earth Object Wide-field Infrared Survey Explorer, otherwise known as the NEOWISE mission, which discovered it in late March.
Content by CNN Underscored

You may be able to see it with the naked eye, but grab a pair of binoculars or peer through a small telescope, if you have either, for a better view.
If you live in an urban area with a lot of light pollution, you may want to find a spot to watch the sky that has less light and obstructions, like tall buildings.
After the sun sets, look for the Big Dipper constellation in the northwestern sky, according to NASA. Just below it, you'll see the comet. It looks a bit like a fuzzy star with a tail.
The comet will continue to rise higher above the northwestern horizon for the rest of this month. It will come closest to Earth on July 22 -- just 64 million miles away.
While comets are unpredictable and can disappear from view at any time, astronomers predict that we should be able to see it for the rest of the month.

And Comet NEOWISE is a survivor. It recently made its closest approach to the sun without breaking apart, which suggests it could have a sturdy structure, rather than a crumbly interior like some comets. The Hubble Space Telescope witnessed Comet ATLAS, discovered in December 2019, break apart into pieces in April.
Comets are really just made up of ice and dust, with some organic material. Many of the comets with long orbits, like NEOWISE, only venture through the inner solar system and close to the sun for a short time.
Scientists compare it to coming out of "cold storage" for the comet because the outer solar system where they originate is so much colder. The warmth of the sun and the inner

solar system causes the ice to melt, although astronomers aren't sure why ATLAS broke apart.
After its closest approach to Earth, Comet NEOWISE will continue on its very long orbit to the edge of the solar system, stretching out 715 astronomical units from our sun. (As a comparison, Earth is one astronomical unit from the sun.)
This is why we won't see the comet again in our lifetimes -- it takes thousands of years to travel the outer solar system before returning to the inner solar system.
But, scientists point out, this means the comet isn't exactly new, only new to us, because it previously passed through Earth's skies when humans were present about 6,800 years ago.

Discovering Comet NEOWISE

While Comet NEOWISE was spotted on March 27 by NASA's Near-Earth Object Wide-field Infrared Survey Explorer, the mission didn't start out to find comets.
Ten years ago, the mission was launched as WISE and it was designed to do an all-sky map in infrared light.
But the team realized that it was also pretty useful for observing asteroids and comets and measuring their sizes and how reflective they were, said Amy Mainzer, the NEOWISE principal investigator at the University of Arizona, in a NASA press conference this week. The NEOWISE mission has found a couple dozen comets so far.
The WISE mission was only designed to last for about seven months, but NASA asked the team to reactivate it after its prime mission concluded in 2013, and they've been using NEOWISE to watch the skies ever since, Mainzer said. The team estimated that the NEOWISE mission only has about one year left.

"We're excited it's still able to find spectacular things like this comet," Mainzer said.
The team spotted Comet NEOWISE by its infrared emissions, meaning they could pick out its heat signature. In late March, the scientists determined it was a comet and when it would pass close to the sun -- and they've been tracking it ever since.
By observing the comet, the researchers have learned that it's about three miles in diameter, the average size for a comet with a long orbit. And it's incredibly bright, even if it's not as spectacular as Comet Hale-Bopp as witnessed in 1997.

Sometimes when comets that have a lot of mass, like NEOWISE, they can blow apart when they come close to the sun. Their ice becomes heated so quickly that it shreds and destroys the comet, Mainzer said. Because this comet survived, it tells astronomers there is something unique about its structural strength.
The comets in our solar system formed at its very beginning. Gas and dust formed in clumps orbiting in a disk around our young sun, and those clumps became planets, asteroids and comets. The comets were kicked out to the edge of the solar system, so their ice remains pristine.
NASA scientists and the NEOWISE team will continue observing the comet with various instruments and cameras to see how it progresses, said Emily Kramer, co-investigator on the NEOWISE science team at NASA's Jet Propulsion Laboratory in Pasadena, California.

Because the comet is so bright, the scientists expect to get better data, and much more of it, than they typically do for most comets, Kramer said.
Most comets are so faint that they can only be seen using the most powerful telescopes. Scientists are looking forward to learning the composition of this comet based on the data they gather. That composition could reveal more information about the "ingredients" used to make our solar system.
Although this comet takes a long time to complete one orbit around the sun, some that originate further out in the solar system can take hundreds of millions of years to orbit the sun or even longer, Mainzer said. Meanwhile, some of the closer comets only take about five or six years to complete an orbit. Comet NEOWISE is in the middle, taking about 7,000 years.
"This is coming in from a medium-long distance," Mainzer said. "How it got there is a bit of a mystery. It may have had a more distant orbit that was perturbed to create this current orbit."

Comet NEOWISE: 10 big questions (and answers) about the icy wanderer
By Chelsea Gohd 13 hours ago

If you spot Comet NEOWISE, let us know! Send images and comments to spacephotos@space.com to share your views.

Comet NEOWISE has is delighting skywatchers around the Northern Hemisphere. But what makes this comet so special?

The comet made its closest approach to the sun on July 3 but, until now, was only visible in the sky before dawn. Now, for keen observers in the Northern Hemisphere, the comet has been getting higher in the evening sky, sparkling northwest below the Big Dipper constellation, according to Joe Masiero, deputy principal investigator of NEOWISE (NASA's Near-Earth Object Wide-field Infrared Survey Explorer, the NASA space telescope that first spotted the comet).

One of the most fascinating details about Comet NEOWISE is that it won't return to our skies for another 6,800 years. But that's not the only thing that makes this icy space rock special. So let's take a dive into what makes Comet NEOWISE unique — and a little weird.

Officially known as C/2020 F3, Comet NEOWISE is a comet that was discovered on March 27, 2020, by NEOWISE, the asteroid-hunting afterlife of the Wide-field Infrared Survey Explorer (WISE) mission.

Comets, often nicknamed "cosmic snowballs," are icy, rocky objects made up of ice, rock and dust. These objects orbit the sun, and as they slip closer to the sun most comets heat

up and start streaming two tails, one made of dust and gas and an "ion tail" made of electrically-charged gas molecules, or ions.

Can I see it?

Yes! Because it is especially bright, the comet is visible in the night sky with the naked eye. Skywatchers in the Northern Hemisphere can spot the object just after sunset, to the northwest just under the Big Dipper constellation.

In fact, the comet is so bright that scientists are "able to get a lot more and better data than we typically do for most comets," Kramer said. "We're able to study it with a wide variety of different telescopes, and that'll allow us to do really interesting studies."

Do I need a telescope?
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No! Because Comet NEOWISE is an especially bright object, it is relatively easy for astronomy enthusiasts to spot it in the night sky with just the naked eye, although binoculars or a small telescope will give you a better view.

"The fact that we can see it is really what makes it unique," Kramer said. "It's quite rare for a comet to be bright enough that we can see it with a naked eye or even with just binoculars."

What does it look like in the sky?

To those spotting the comet with the naked eye, without any tools or instruments like a telescope, it looks like a fuzzy star with a little bit of a tail. You do need to be away from city lights, though.

With binoculars or a small telescope, the comet will be more clear and the tail will be easier to spot.

How much water is in the comet?

There is "about 13 million Olympic swimming pools of water," in Comet NEOWISE, Emily Kramer, a science team co-investigator forNASA's NEOWISE at NASA's Jet Propulsion Laboratory, said during a news conference July 15. "So that's a lot of water."

"Most comets are about half water and half dust," she added.

Does it have a tail?

Comet NEOWISE has two tails that typically accompany every comet.

As a comet nears the sun, it warms up and material pulls away from the surface into a tail. Often, dust is pulled away along with gases from sublimating (going directly from

solid to a gas) ice. This dust tail is the sweeping trail seen in most comet images. Comets also have an ion tail made up of ionized gas blown back by the solar wind.

Researchers studying Comet NEOWISE might actually also have a sodium tail. By observing what they believe to be atomic sodium in the comet's tail, researchers can glean keen insight into the object's makeup.

How big is Comet NEOWISE?

Comet NEOWISE is about 3 miles (5 kilometers) in diameter, "which is a reasonably large but roughly average-size comet," Kramer said.

"It's rare to see something that's this bright," she added. "There are comets that are of this size that we see regularly, but most of them are so from Earth that they don't get this bright. They're too far from the sun and the Earth to be able to see them in the way that we're seeing this Comet NEOWISE."

How fast is Comet NEOWISE?

The comet is traveling at about 40 miles per second (that's about 144,000 mph, or 231,000 km/h).

Joe Masiero, deputy principal investigator of the NEOWISE mission, said the the comet is moving about twice as fast as the Earth's speed around the sun. But don't expect that rapid clip to last.

Because of the comet's extremely elliptical orbit, it will slow down as it reaches its farthest point from the sun, then fall back toward the inner solar system and accelerate again when it heads back round the sun. That trip around the sun is over for Comet NEOWISE's current orbit and it's moving back to the outer solar system.

"And so as it goes farther from the sun, [it] will be slowing down as it climbs back up that gravity well," Masiero said.

Will it hit Earth?

Have no fear, Comet NEOWISE will not hit Earth.

"This particular comet has no possibility of impacting the Earth. It crosses the plane of Earth orbit well inside of recovery orbit and almost near the orbit of Mercury, so there's absolutely no hazard from this comet," Lindley Johnson, the planetary defense officer and program executive of NASA's Planetary Defense Coordination Office at NASA Headquarters, said during the news conference.

The comet orbits the sun every 600 to 700 years, Johnson said. The comet is currently about 70 million miles (111 million kilometers) away from Earth.

Is it from interstellar space?

No, Comet NEOWISE originates in our own solar system. To date, only two interstellar objects have been discovered: 'Oumuamua and Comet Borisov.

"This one we know it's not Interstellar object. By watching its motion, we can see that it's bound to the sun's gravity," Kramer said. "So it's coming in very rapidly and then it's going to go far back out again and then but then should come back in again in about 6,800 years."

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COMET RESOURCE CENTER
NOTABLE UPCOMING COMETS

Last updated: July 1, 2020
For planning purposes, on this page I will list the incoming comets that are expected to become moderately bright or otherwise notable within the next one to two years, and which I expect to add to my tally (if I haven't already). I don't intend this list to be exhaustive, but instead will focus on those comets that are worthy of attention from sky-watchers and other interested people (including, certainly, students) who would not normally be considered "comet astronomers." I plan to update this page every one to two months and/or as necessary.

The "long-range" comets listed at the end of this page are, as implied, mentioned here primarily for long-range planning purposes.

COMET 11P/TEMPEL-SWIFT-LINEAR (Perihelion 2020 November 26)

This rather famous comet was lost for almost a century, but was finally re-discovered by the LINEAR program in late 2001. It has remained a dim and distant object since that

time, however a moderately close approach to Jupiter in 2018 decreased the perihelion distance somewhat and the viewing geometry in 2020 is quite favorable, with the comet's being at opposition in mid-September and passing 0.49 AU from Earth in early November. There haven't been any visual observations of this comet in over 100 years and thus it is difficult to know what to expect, but hopefully the favorable viewing conditions might allow it to become visually detectable.

COMET 141P/MACHHOLZ 2 (Perihelion 2020 December 15)

Prior to this comet's discovery return in 1994 (no. 193) it fragmented into several pieces, some of which were visually detectable during that return (with the primary component becoming as bright as 7th magnitude). The secondary components have all faded away since then -- although the brightest one was still visually detectable for a while during the 1999 return (no. 273) -- and the primary itself has faded quite a bit, appearing as only a vague, diffuse object of 12th magnitude in 2015 (no. 581); meanwhile, a new faint component was detected in CCD images during that return. The viewing geometry for the 2020 return is moderately favorable, with the comet's passing 0.52 AU from Earth in mid-January 2021; how bright the primary component might become, and whether or not any other components might be present, remains to be seen.

COMET 7P/PONS-WINNECKE (Perihelion 2021 May 27)

This long-known comet has a rather storied history, which includes a series of close approaches to Earth during the early decades of the 20th Century, although since it has been perturbed into a larger orbit it can no longer make such approaches. The 2021 return is the most favorable one it will have had in several decades, with a minimum distance from Earth of 0.44 AU taking place in mid-June, and it should reach 10th or 11th magnitude. It has already been recovered as a very faint object in early January 2020.

LONG-RANGE COMETS

COMET PANSTARRS C/2017 K2 (Perihelion 2022 December 19)

Despite being located at a heliocentric distance of 16.1 AU, this comet was clearly active, and a relatively bright 19th to 20th magnitude, when discovered in May 2017. Even more remarkably, in pre-discovery images taken as far back as May 2013, the comet is clearly

active even at a heliocentric distance of 23.7 AU. The high intrinsic brightness, and high activity level at such large distances from the sun, is somewhat reminiscent of Comet Hale-Bopp C/1995 O1 (no. 199).
Unfortunately, the comet's perihelion distance is still a relatively large 1.80 AU. Even more unfortunately, the comet is on the far side of the sun from Earth at the time, never coming closer than 2.23 AU. While naked-eye visibility, perhaps even conspicuous naked-eye visibility, would seem to be almost a certainty, the comet is unlikely to become "Great."

And even more unfortunately for northern hemisphere observers, the comet is in southern circumpolar skies at the time of perihelion. Indeed, the comet is inaccessible from the northern hemisphere for almost a full year (September 2022 through August 2023).

Comet PANSTARRS C/2017 K2 (small diffuse object in center) as imaged on March 6, 2018, by the Las Cumbres Observatory facility at McDonald Observatory in Texas. At the time this image was taken, the comet's heliocentric distance was 14.4 AU.
COMET 12P/PONS-BROOKS (Perihelion 2024 April 21)
This "classical" Halley-type comet (period 70 years) last returned in 1954, four years before I was born. The viewing geometry in 2024 is, unfortunately, rather unfavorable, as during the run-up to perihelion the comet remains on the far side of the sun from Earth and is only visible for a brief period of time in the northwestern sky after dusk, at a small elongation (37 degrees in mid-March, shrinking to 28 degrees by month's end and to 23 degrees by perihelion). Despite the poor viewing geometry, the comet is intrinsically rather bright, and should reach a peak brightness close to 5th magnitude. After perihelion the comet travels southward and is visible from the southern hemisphere as it recedes and fades.

UPDATE (June 28, 2020): Comet Pons-Brooks was recovered on June 10, 2020 -- almost four years before perihelion passage -- by a team of astronomers led by Matthew Knight utilizing the Lowell Discovery Telescope in Arizona (with confirming images obtained on June 17). The comet's heliocentric distance at the time of its recovery was 11.93 AU, and it appeared as a very faint object near 23rd magnitude, with a short tail indicating that it is already active.

COMET 13P/OLBERS (Perihelion 2024 June 30)

This other "classical" Halley-type comet (period 68 years) last returned in 1956, two years after the above comet and two years before I was born. Also as with the above comet, the viewing geometry remains relatively poor, with the comet's remaining on the far side of the sun from Earth; on the other hand, it is almost identical to the viewing geometry in 1956. It remains in the northern hemisphere's evening sky throughout the period of prime visibility, albeit at a small elongation (dropping below 30 degrees in

early May, to a minimum of 25.5 degrees in early June before increasing back to 30 degrees by perihelion to a maximum of 39 degrees in August). Based upon the reported brightnesses in 1956, the comet should reach a peak brightness between 6th and 7th magnitude.

Around mid-April 12P/Pons-Brooks and 13P/Olbers will be located some 15 degrees from each other, the latter comet being higher (to the east and north) of the former one.