
NASA
Tour Stunning Hubble
Nebulae Images

1
00:00:07,030 --> 00:00:04,710
over the years the hubble space

2
00:00:09,509 --> 00:00:07,040
telescope has taken hundreds of images

3
00:00:11,589 --> 00:00:09,519
of different kinds of incredible nebulae

4
00:00:14,390 --> 00:00:11,599
in our universe

5
00:00:17,349 --> 00:00:14,400
a nebula is a giant cloud of dust and

6
00:00:19,750 --> 00:00:17,359
gas in space there are different types

7
00:00:22,470 --> 00:00:19,760
of nebulae ranging from sites where

8
00:00:25,509 --> 00:00:22,480
stars are being born under gravitational

9
00:00:28,310 --> 00:00:25,519
pressures to expanding gaseous remnants

10
00:00:30,310 --> 00:00:28,320
thrown off by dying stars

11
00:00:33,190 --> 00:00:30,320
the famous orion nebula is a

12
00:00:34,389 --> 00:00:33,200
star-forming region only 1500 light

13
00:00:37,270 --> 00:00:34,399

years away

14
00:00:39,350 --> 00:00:37,280
making it the closest large star-forming

15
00:00:41,430 --> 00:00:39,360
region to earth

16
00:00:44,389 --> 00:00:41,440
because it is so bright and prominent

17
00:00:46,310 --> 00:00:44,399
located just below orion's belt this

18
00:00:48,150 --> 00:00:46,320
nebula is one we can see with the

19
00:00:50,229 --> 00:00:48,160
unaided eye

20
00:00:53,590 --> 00:00:50,239
it also offers an excellent peak at

21
00:00:56,630 --> 00:00:53,600
stellar birth for those with telescopes

22
00:00:59,430 --> 00:00:56,640
this nebula is an enormous cloud of gas

23
00:01:01,029 --> 00:00:59,440
and dust where vast numbers of new stars

24
00:01:03,510 --> 00:01:01,039
are forged

25
00:01:06,149 --> 00:01:03,520
its bright central region is the home of

26
00:01:07,750 --> 00:01:06,159
four massive young stars that shape the

27
00:01:09,830 --> 00:01:07,760
nebula

28
00:01:12,550 --> 00:01:09,840
these four hefty stars are called the

29
00:01:15,350 --> 00:01:12,560
trapezium because they are arranged in a

30
00:01:17,590 --> 00:01:15,360
trapezoidal pattern

31
00:01:20,630 --> 00:01:17,600
ultraviolet light unleashed by these

32
00:01:22,789 --> 00:01:20,640
stars is carving a cavity in the nebula

33
00:01:25,030 --> 00:01:22,799
and disrupting the growth of hundreds of

34
00:01:27,429 --> 00:01:25,040
smaller stars

35
00:01:29,830 --> 00:01:27,439
this stunning hubble image offers the

36
00:01:31,270 --> 00:01:29,840
sharpest view of the orion nebula ever

37
00:01:34,230 --> 00:01:31,280
obtained

38
00:01:37,030 --> 00:01:34,240

created using 520 different hubble

39
00:01:38,149 --> 00:01:37,040
exposures taken in multiple wavelengths

40
00:01:40,870 --> 00:01:38,159
of light

41
00:01:42,630 --> 00:01:40,880
this mosaic contains over 1 billion

42
00:01:45,030 --> 00:01:42,640
pixels

43
00:01:46,310 --> 00:01:45,040
the image's orange color represents

44
00:01:49,510 --> 00:01:46,320
hydrogen

45
00:01:52,310 --> 00:01:49,520
green is oxygen and red represents both

46
00:01:54,230 --> 00:01:52,320
sulfur and observations made in infrared

47
00:01:56,389 --> 00:01:54,240
light

48
00:01:59,270 --> 00:01:56,399
while the orion nebula is in the midst

49
00:02:03,510 --> 00:01:59,280
of creating new stars other nebulae

50
00:02:06,230 --> 00:02:03,520
result from aging and dying stars

51
00:02:09,029 --> 00:02:06,240
this image of the cat's eye nebula shows

52
00:02:11,190 --> 00:02:09,039
a bull's-eye pattern of 11 or even more

53
00:02:13,589 --> 00:02:11,200
concentric rings

54
00:02:16,150 --> 00:02:13,599
each ring is actually the edge of a

55
00:02:18,869 --> 00:02:16,160
spherical bubble seen projected onto the

56
00:02:20,949 --> 00:02:18,879
sky that's why it appears bright along

57
00:02:23,589 --> 00:02:20,959
its outer edge

58
00:02:26,470 --> 00:02:23,599
observations suggest cat's eye was

59
00:02:29,990 --> 00:02:26,480
created when a medium-sized star ejected

60
00:02:31,750 --> 00:02:30,000
its mass in a series of pulses at 1500

61
00:02:34,630 --> 00:02:31,760
year intervals

62
00:02:37,270 --> 00:02:34,640
these convulsions created dust shells

63
00:02:40,070 --> 00:02:37,280

that form a layered concentric structure

64
00:02:42,390 --> 00:02:40,080
around the dying star

65
00:02:45,430 --> 00:02:42,400
the view from hubble is like seeing an

66
00:02:47,430 --> 00:02:45,440
onion cut in half where each skin layer

67
00:02:50,390 --> 00:02:47,440
appears as a ring

68
00:02:52,229 --> 00:02:50,400
each shell contains as much mass as all

69
00:02:54,949 --> 00:02:52,239
of the planets in our solar system

70
00:02:59,830 --> 00:02:57,430
then there are the supernova remnants

71
00:03:02,149 --> 00:02:59,840
like the crab nebula

72
00:03:04,630 --> 00:03:02,159
these nebulae are made of debris from

73
00:03:07,350 --> 00:03:04,640
exploded stars

74
00:03:10,390 --> 00:03:07,360
in the year 1054 a.d

75
00:03:12,790 --> 00:03:10,400
chinese astronomers recorded a guest

76
00:03:16,070 --> 00:03:12,800
star that was visible even in the

77
00:03:18,390 --> 00:03:16,080
daytime sky for nearly a month

78
00:03:20,710 --> 00:03:18,400
the guest star they observed was

79
00:03:23,589 --> 00:03:20,720
actually the supernova explosion that

80
00:03:26,309 --> 00:03:23,599
created the crab nebula

81
00:03:28,949 --> 00:03:26,319
today the crab nebula is still visible

82
00:03:31,990 --> 00:03:28,959
as a six light-year-wide remnant of that

83
00:03:34,710 --> 00:03:32,000
violent event

84
00:03:37,750 --> 00:03:34,720
this large mosaic of the crab nebula was

85
00:03:40,869 --> 00:03:37,760
assembled from 24 individual exposures

86
00:03:42,949 --> 00:03:40,879
captured by hubble over three months

87
00:03:45,670 --> 00:03:42,959
the orange filaments are the tattered

88
00:03:47,270 --> 00:03:45,680

remains of the star and consist mostly

89
00:03:50,470 --> 00:03:47,280
of hydrogen

90
00:03:52,710 --> 00:03:50,480
green is sulfur and red indicates doubly

91
00:03:55,030 --> 00:03:52,720
ionized oxygen

92
00:03:57,910 --> 00:03:55,040
these elements were expelled during the

93
00:04:00,470 --> 00:03:57,920
supernova explosion

94
00:04:03,429 --> 00:04:00,480
the leftover ultra dense core of the

95
00:04:06,149 --> 00:04:03,439
exploded star remains as a rapidly

96
00:04:08,309 --> 00:04:06,159
spinning neutron star in the center of

97
00:04:11,110 --> 00:04:08,319
the crab nebula

98
00:04:13,589 --> 00:04:11,120
electrons rolling at nearly the speed of

99
00:04:16,710 --> 00:04:13,599
light around the star's magnetic field

100
00:04:19,430 --> 00:04:16,720
lines produce the eerie blue light in

101
00:04:22,310 --> 00:04:19,440
the interior of the nebula

102
00:04:25,430 --> 00:04:22,320
the neutron star like a lighthouse

103
00:04:28,310 --> 00:04:25,440
ejects twin beams of radiation that make

104
00:04:31,510 --> 00:04:28,320
it appear to pulse 30 times per second

105
00:04:35,909 --> 00:04:33,670
nebulae are some of the most beautiful

106
00:04:38,870 --> 00:04:35,919
objects in our universe

107
00:04:41,510 --> 00:04:38,880
their incredible shapes and colors will

108
00:04:43,350 --> 00:04:41,520
always inspire humanity to keep looking

109
00:04:45,189 --> 00:04:43,360
up at the stars

110
00:04:47,990 --> 00:04:45,199
and with instruments like the hubble

111
00:04:50,469 --> 00:04:48,000
space telescope we will continue to be