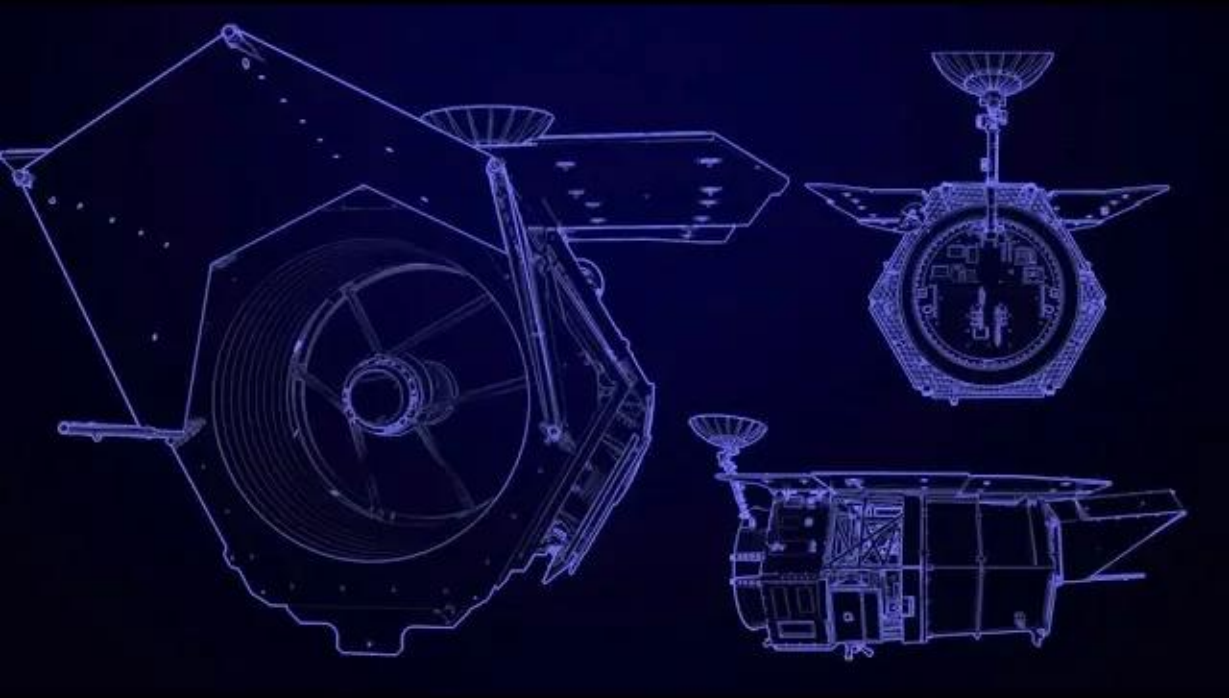

1
00:00:06,950 --> 00:00:03,990
nasa's wide field infrared survey

2
00:00:09,190 --> 00:00:06,960
telescope wfirst is designed to answer

3
00:00:11,430 --> 00:00:09,200
big questions about the universe

4
00:00:12,870 --> 00:00:11,440
what is dark energy which seems to be

5
00:00:14,070 --> 00:00:12,880
speeding up the expansion of the

6
00:00:16,230 --> 00:00:14,080
universe

7
00:00:18,470 --> 00:00:16,240
how many planets exist among the stars

8
00:00:21,029 --> 00:00:18,480
and what are they like

9
00:00:22,790 --> 00:00:21,039
wfirst is similar to hubble but benefits

10
00:00:23,990 --> 00:00:22,800
from 30 years of technological

11
00:00:25,830 --> 00:00:24,000
development

12
00:00:28,630 --> 00:00:25,840
it will view the sky on a scale never

13
00:00:30,630 --> 00:00:28,640

before accomplished from space

14
00:00:33,110 --> 00:00:30,640
this is where wfirst is closest to

15
00:00:36,310 --> 00:00:33,120
hubble it has the same size and type of

16
00:00:38,549 --> 00:00:36,320
main mirror a 2.4 meter precisely shaped

17
00:00:40,709 --> 00:00:38,559
piece of silver-coated glass

18
00:00:44,389 --> 00:00:40,719
the size of this mirror is partly how w

19
00:00:46,630 --> 00:00:44,399
first matches hubble's resolution

20
00:00:48,310 --> 00:00:46,640
wfirst main camera is the wide field

21
00:00:50,790 --> 00:00:48,320
instrument which will take infrared

22
00:00:53,110 --> 00:00:50,800
pictures of the sky to study dark energy

23
00:00:54,549 --> 00:00:53,120
observe galaxies and stars and find

24
00:00:56,069 --> 00:00:54,559
exoplanets

25
00:00:58,630 --> 00:00:56,079
instead of hubble's single first

26
00:01:01,430 --> 00:00:58,640
generation image sensor the wfi

27
00:01:03,189 --> 00:01:01,440
incorporates 18 third generation chips

28
00:01:06,390 --> 00:01:03,199
that allow it to take pictures capturing

29
00:01:08,950 --> 00:01:06,400
100 times greater sky area than hubble's

30
00:01:10,870 --> 00:01:08,960
each 300 megapixel image will enable

31
00:01:13,109 --> 00:01:10,880
scientists to study a large portion of

32
00:01:15,590 --> 00:01:13,119
the sky

33
00:01:17,670 --> 00:01:15,600
at wfirst's back is its primary means of

34
00:01:20,390 --> 00:01:17,680
communication with earth the high gain

35
00:01:22,950 --> 00:01:20,400
antenna this antenna will be responsible

36
00:01:25,030 --> 00:01:22,960
for sending nearly 1.4 terabytes of data

37
00:01:27,830 --> 00:01:25,040
to ground stations every day

38
00:01:29,910 --> 00:01:27,840

that's the equivalent of 460 hours worth

39
00:01:32,390 --> 00:01:29,920
of streaming video

40
00:01:34,550 --> 00:01:32,400
wfirst critical systems such as power

41
00:01:37,030 --> 00:01:34,560
and data handling are located in six

42
00:01:39,350 --> 00:01:37,040
modules at the spacecraft's rear

43
00:01:41,270 --> 00:01:39,360
these include six rotating reaction

44
00:01:42,389 --> 00:01:41,280
wheels that control where the spacecraft

45
00:01:44,550 --> 00:01:42,399
points

46
00:01:46,870 --> 00:01:44,560
nearly one ton of propellant for larger

47
00:01:49,350 --> 00:01:46,880
movements and a 10 terabyte data

48
00:01:51,190 --> 00:01:49,360
recorder

49
00:01:54,149 --> 00:01:51,200
wfirst's other instrument is its

50
00:01:56,550 --> 00:01:54,159
coronagraph technology demonstration

51
00:01:58,230 --> 00:01:56,560
a coronagraph blocks a star's light to

52
00:01:59,670 --> 00:01:58,240
capture the faint light from orbiting

53
00:02:01,270 --> 00:01:59,680
planets

54
00:02:03,590 --> 00:02:01,280
it will be the first time a space

55
00:02:05,830 --> 00:02:03,600
telescope has used deformable mirrors to

56
00:02:07,749 --> 00:02:05,840
precisely control the incoming light and

57
00:02:09,029 --> 00:02:07,759
special masks to block only the

58
00:02:11,110 --> 00:02:09,039
starlight

59
00:02:13,830 --> 00:02:11,120
this method will enable wfirst to

60
00:02:15,430 --> 00:02:13,840
capture direct images of distant planets

61
00:02:17,750 --> 00:02:15,440
and even analyze the light that is

62
00:02:19,030 --> 00:02:17,760
reflected off their surfaces allowing

63
00:02:22,309 --> 00:02:19,040

scientists to learn about their

64
00:02:24,309 --> 00:02:22,319
composition and atmospheres

65
00:02:26,309 --> 00:02:24,319
the spacecraft's solar panels provide

66
00:02:27,670 --> 00:02:26,319
its power by converting sunlight into

67
00:02:29,910 --> 00:02:27,680
electricity

68
00:02:31,589 --> 00:02:29,920
they also shade the spacecraft helping

69
00:02:33,270 --> 00:02:31,599
to keep its instruments at their design

70
00:02:35,150 --> 00:02:33,280
temperatures

71
00:02:38,390 --> 00:02:35,160
the solar panels will be able to provide

72
00:02:41,750 --> 00:02:38,400
4100 watts of power enough to run two

73
00:02:43,910 --> 00:02:41,760
commercial microwave ovens

74
00:02:45,990 --> 00:02:43,920
with all these systems working together

75
00:02:47,190 --> 00:02:46,000
and in partnership with powerful future

76
00:02:49,589 --> 00:02:47,200
telescopes

77
00:02:52,840 --> 00:02:49,599
wfirst will be able to usher in a new