1
00:00:20,120 --> 00:00:17,570
everything in nature from the most

2
00:00:22,970 --> 00:00:20,130
distant quasar to the coldest chunk of

3
00:00:25,400 --> 00:00:22,980
cometary ice shines in a particular

4
00:00:28,040 --> 00:00:25,410
wavelength of light depending on its

5
00:00:29,750 --> 00:00:28,050
temperature many phenomena in the

6
00:00:33,380 --> 00:00:29,760
universe cannot be seen with the naked

7
00:00:36,549 --> 00:00:33,390
eye hot objects such as Paul SARS or

8
00:00:39,709 --> 00:00:36,559
dying stars emit gamma rays and x-rays

9
00:00:43,040 --> 00:00:39,719
while cold objects such as stars being

10
00:00:44,869 --> 00:00:43,050
formed emit light in the infrared these

11
00:00:46,850 --> 00:00:44,879
wavelengths can only be detected with

12
00:00:49,819 --> 00:00:46,860
very sophisticated instruments placed

13
00:00:52,520 --> 00:00:49,829

above our atmosphere to observe the full

14
00:00:54,619 --> 00:00:52,530
spectrum of light NASA plans to place an

15
00:00:59,100 --> 00:00:54,629
orbit around the Earth for Great

16
00:01:03,750 --> 00:01:01,320
the first of the four observatories will

17
00:01:05,450 --> 00:01:03,760
be the Hubble Space Telescope the most

18
00:01:25,899 --> 00:01:05,460
complex and powerful astronomical

19
00:01:31,209 --> 00:01:28,389
once in orbit the Space Telescope will

20
00:01:34,020 --> 00:01:31,219
see the sky in all its splendor stripped

21
00:01:36,490 --> 00:01:34,030
of the murky veil of Earth's atmosphere

22
00:01:39,340 --> 00:01:36,500
at the heart of the telescope is its

23
00:01:41,889 --> 00:01:39,350
near perfect 8-foot mirror it took two

24
00:01:43,980 --> 00:01:41,899
years for perkin-elmer to grind college

25
00:01:46,990 --> 00:01:43,990
and coke this single piece of glass

26
00:01:49,569 --> 00:01:47,000
capable of focusing light that began its

27
00:01:53,169 --> 00:01:49,579
journey through space 10 billion years

28
00:01:56,020 --> 00:01:53,179
ago you can think of the Space Telescope

29
00:01:57,819 --> 00:01:56,030
as a time machine because the speed of

30
00:02:00,850 --> 00:01:57,829
light is flying on it it takes time for

31
00:02:02,260 --> 00:02:00,860
light to get from there to here okay if

32
00:02:04,630 --> 00:02:02,270
we're looking at an object that's 10

33
00:02:07,119 --> 00:02:04,640
billion light-years away which is about

34
00:02:09,969 --> 00:02:07,129
as far as space telescope can see and

35
00:02:13,270 --> 00:02:09,979
define what is singing we're seeing an

36
00:02:15,789 --> 00:02:13,280
object whose white left at 10 billion

37
00:02:18,640 --> 00:02:15,799
years ago the universe is believed to

38
00:02:21,819 --> 00:02:18,650

have begun about 15 billion years ago in

39
00:02:23,619 --> 00:02:21,829
an explosion called the Big Bang since

40
00:02:26,979 --> 00:02:23,629
then everything in the universe has been

41
00:02:29,349 --> 00:02:26,989
moving away from us will galaxies and

42
00:02:31,990 --> 00:02:29,359
the billions of stars they contain keep

43
00:02:35,229 --> 00:02:32,000
getting further and further away or will

44
00:02:37,449 --> 00:02:35,239
everything eventually contract Space

45
00:02:41,559 --> 00:02:37,459
Telescope will provide the first real

46
00:02:43,870 --> 00:02:41,569
answers to these questions images of the

47
00:02:45,759 --> 00:02:43,880
planets will be ten times clearer than

48
00:02:48,430 --> 00:02:45,769
those taken by the best earthbound

49
00:02:50,650 --> 00:02:48,440
telescopes in use today they will be

50
00:02:53,259 --> 00:02:50,660
similar to those relayed by the robotic

51
00:02:55,449 --> 00:02:53,269
spacecraft Voyager during its brief

52
00:02:58,089 --> 00:02:55,459
encounter with the planets but Space

53
00:03:00,159 --> 00:02:58,099
Telescope during its 15 year lifespan

54
00:03:02,970 --> 00:03:00,169
will be capable of studying these

55
00:03:06,339 --> 00:03:02,980
objects over an extended period of time

56
00:03:09,220 --> 00:03:06,349
it's fine guidance sensors can point for

57
00:03:12,190 --> 00:03:09,230
a period of 24 hours with a stability of

58
00:03:14,589 --> 00:03:12,200
seven milliseconds according to NASA's

59
00:03:16,569 --> 00:03:14,599
director of astrophysics dr. Charles

60
00:03:18,909 --> 00:03:16,579
pellerin if you were to take a laser in

61
00:03:21,370 --> 00:03:18,919
Washington and aim it at New York City

62
00:03:23,920 --> 00:03:21,380
where the accuracy instability of seven

63
00:03:25,629 --> 00:03:23,930

million seconds you could have a person

64
00:03:27,909 --> 00:03:25,639
stand on a World Trade Center and hold a

65
00:03:30,069 --> 00:03:27,919
dime that laser would never depart from

66
00:03:32,949 --> 00:03:30,079
that time and this is what the device

67
00:03:35,469 --> 00:03:32,959
that's very large weighs about 24,000

68
00:03:37,749 --> 00:03:35,479
pounds as wheel spinning has motors

69
00:03:39,010 --> 00:03:37,759
meeting antennas turning with all this

70
00:03:40,720 --> 00:03:39,020
activity

71
00:03:44,530 --> 00:03:40,730
device will still point to any place in

72
00:03:46,780 --> 00:03:44,540
space with that decision quasars are

73
00:03:49,660 --> 00:03:46,790
probably the most distant objects in our

74
00:03:53,170 --> 00:03:49,670
universe they have an energy output a

75
00:03:55,090 --> 00:03:53,180
thousand times our whole galaxy yet all

76
00:03:57,280 --> 00:03:55,100
this energy appears to be coming from a

77
00:03:59,890 --> 00:03:57,290
point of light the size of our solar

78
00:04:03,190 --> 00:03:59,900
system where is all this energy coming

79
00:04:04,810 --> 00:04:03,200
from looking at this and other mysteries

80
00:04:08,250 --> 00:04:04,820
will be the second of the great

81
00:04:10,570 --> 00:04:08,260
telescopes the gamma ray observatory

82
00:04:13,180 --> 00:04:10,580
there are some theories that say the

83
00:04:16,000 --> 00:04:13,190
energy coming from quasars may be caused

84
00:04:18,729 --> 00:04:16,010
by a huge black hole sucking up whole

85
00:04:21,370 --> 00:04:18,739
stars and then somehow spitting the

86
00:04:23,440 --> 00:04:21,380
energy back out the third of the Great

87
00:04:26,050 --> 00:04:23,450
observatories the advanced x-ray

88
00:04:28,180 --> 00:04:26,060

astrophysics facility will study violent

89
00:04:30,970 --> 00:04:28,190
events of this nature which emit vast

90
00:04:33,040 --> 00:04:30,980
amounts of x-rays we see cataclysmic

91
00:04:35,530 --> 00:04:33,050
violence high energy is going on in

92
00:04:37,960 --> 00:04:35,540
almost every Astrophysical object it's

93
00:04:39,670 --> 00:04:37,970
x-ray astronomy through a sensitivity to

94
00:04:42,040 --> 00:04:39,680
the sort of million degree temperatures

95
00:04:45,250 --> 00:04:42,050
that are caused by hot cazness that

96
00:04:48,660 --> 00:04:45,260
really record the violent events parlor

97
00:04:51,790 --> 00:04:48,670
the universe we see a whole raft of

98
00:04:54,820 --> 00:04:51,800
fascinating activity that a uniquely

99
00:04:57,160 --> 00:04:54,830
x-ray field the last of the four Great

100
00:04:59,470 --> 00:04:57,170
observatories the space infrared

101
00:05:01,450 --> 00:04:59,480
telescope facility should complete our

102
00:05:04,780 --> 00:05:01,460
new view of what is going on in the

103
00:05:07,300 --> 00:05:04,790
universe its domain the very coldest

104
00:05:10,379 --> 00:05:07,310
objects in the sky where stars are born

105
00:05:13,779 --> 00:05:10,389
and planets begin to form

106
00:05:16,449 --> 00:05:13,789
NASA's four Great observatories pushing

107
00:05:19,059 --> 00:05:16,459
technology into the 21st century to

108
00:05:21,620 --> 00:05:19,069
provide a new more complete picture of