
AND FROM THIS WE HAVE BEEN ABLE
TO PIN DOWN BLACK HOLES AND

1
00:00:18,790 --> 00:00:17,349
yeah dark matter

2
00:00:22,230 --> 00:00:18,800
black holes

3
00:00:24,550 --> 00:00:22,240
supernovas mysterious galactic phenomena

4
00:00:27,990 --> 00:00:24,560
that hold the secrets to the origin

5
00:00:30,390 --> 00:00:28,000
evolution and destiny of the universe

6
00:00:33,670 --> 00:00:30,400
today those secrets are unraveling

7
00:00:36,630 --> 00:00:33,680
faster than ever due in large part to

8
00:00:39,990 --> 00:00:36,640
discoveries made by nasa's chandra x-ray

9
00:00:43,270 --> 00:00:40,000
observatory a powerful telescope system

10
00:00:45,990 --> 00:00:43,280
designed to view and record x-rays from

11
00:00:47,830 --> 00:00:46,000
high-energy regions of the universe

12
00:00:49,190 --> 00:00:47,840
chandra really gives us information

13
00:00:53,270 --> 00:00:49,200

about the universe that the other

14
00:00:55,430 --> 00:00:53,280
missions don't and can't it's it's x-ray

15
00:00:57,830 --> 00:00:55,440
sensitivity sheds light on what's going

16
00:00:59,510 --> 00:00:57,840
on at very high energies and these are

17
00:01:01,750 --> 00:00:59,520
processes that you wouldn't even have

18
00:01:03,830 --> 00:01:01,760
suspected were going on if there weren't

19
00:01:05,830 --> 00:01:03,840
x-rays there to tell you about them

20
00:01:09,109 --> 00:01:05,840
and from this you know we have been able

21
00:01:12,710 --> 00:01:09,119
to pin down black holes and neutron

22
00:01:14,789 --> 00:01:12,720
stars and supernova in a way that

23
00:01:15,830 --> 00:01:14,799
couldn't be done without this type of

24
00:01:18,390 --> 00:01:15,840
instrument

25
00:01:20,950 --> 00:01:18,400
chandra has the most sophisticated x-ray

26
00:01:23,429 --> 00:01:20,960
detection system ever built providing

27
00:01:25,590 --> 00:01:23,439
scientists with astronomical details

28
00:01:28,469 --> 00:01:25,600
previously inaccessible

29
00:01:31,030 --> 00:01:28,479
the observatory has three components the

30
00:01:33,190 --> 00:01:31,040
x-ray telescope whose four pairs of

31
00:01:34,149 --> 00:01:33,200
mirrors focus x-rays from celestial

32
00:01:35,830 --> 00:01:34,159
bodies

33
00:01:37,990 --> 00:01:35,840
science instruments that record the

34
00:01:39,350 --> 00:01:38,000
x-rays from which images are produced

35
00:01:42,310 --> 00:01:39,360
for analysis

36
00:01:44,710 --> 00:01:42,320
and the spacecraft itself which provides

37
00:01:46,149 --> 00:01:44,720
a safe environment for the telescope and

38
00:01:48,469 --> 00:01:46,159

instruments

39
00:01:50,630 --> 00:01:48,479
flying more than 200 times higher than

40
00:01:51,749 --> 00:01:50,640
hubble more than a third of the way to

41
00:01:54,310 --> 00:01:51,759
the moon

42
00:01:57,510 --> 00:01:54,320
chandra observes x-rays from clouds of

43
00:02:00,550 --> 00:01:57,520
gas some of which are so vast it takes

44
00:02:02,630 --> 00:02:00,560
light five million years to go from one

45
00:02:04,310 --> 00:02:02,640
side to the other there's two kinds of

46
00:02:06,789 --> 00:02:04,320
questions that that chandra has been

47
00:02:09,749 --> 00:02:06,799
focusing on lately one of them is more

48
00:02:11,750 --> 00:02:09,759
cosmological in nature having to do with

49
00:02:14,309 --> 00:02:11,760
the existence of dark matter and the

50
00:02:16,229 --> 00:02:14,319
existence of dark energy both of which

51
00:02:18,150 --> 00:02:16,239
chandra can

52
00:02:21,430 --> 00:02:18,160
shed some light on and these are very

53
00:02:23,589 --> 00:02:21,440
pressing problems with today's cosmology

54
00:02:25,110 --> 00:02:23,599
issues another area that chandra's been

55
00:02:27,190 --> 00:02:25,120
making a lot of progress lately is the

56
00:02:29,190 --> 00:02:27,200
study of supernova remnants it's

57
00:02:31,910 --> 00:02:29,200
discovered the most recent supernova

58
00:02:33,830 --> 00:02:31,920
that has taken place in our galaxy and

59
00:02:34,790 --> 00:02:33,840
in some of the older supernova remnants

60
00:02:37,110 --> 00:02:34,800
it's been

61
00:02:38,390 --> 00:02:37,120
measuring the temperature structure and

62
00:02:42,949 --> 00:02:38,400
the

63
00:02:45,190 --> 00:02:42,959

supernova remnant

64
00:02:48,710 --> 00:02:45,200
nine years after launch and deployment

65
00:02:51,589 --> 00:02:48,720
of this technological marvel in 1999

66
00:02:54,630 --> 00:02:51,599
chandra continues to operate smoothly

67
00:02:57,270 --> 00:02:54,640
delivering exclusive premier images of

68
00:03:01,350 --> 00:02:57,280
galaxy clusters remnants of exploding

69
00:03:03,670 --> 00:03:01,360
stars and other events of the cosmos