
HUBBLE MAKES UNEXPECTED
DARK MATTER DISCOVERY

1
00:00:07,909 --> 00:00:05,749
astronomers seem to have revealed a

2
00:00:09,190 --> 00:00:07,919
puzzling detail in the way dark matter

3
00:00:11,910 --> 00:00:09,200
behaves

4
00:00:14,709 --> 00:00:11,920
they found small dense concentrations of

5
00:00:17,349 --> 00:00:14,719
dark matter that bend and magnify light

6
00:00:20,230 --> 00:00:17,359
much more strongly than expected

7
00:00:22,310 --> 00:00:20,240
dark matter is a mysterious invisible

8
00:00:25,429 --> 00:00:22,320
substance that makes up the bulk of a

9
00:00:27,670 --> 00:00:25,439
galaxy the gravitational pull exerted by

10
00:00:29,910 --> 00:00:27,680
dark matter is thought to tie galaxies

11
00:00:32,310 --> 00:00:29,920
together throughout the universe there

12
00:00:34,630 --> 00:00:32,320
is so much regular matter and dark

13
00:00:37,190 --> 00:00:34,640

matter concentrated in massive galaxy

14
00:00:39,510 --> 00:00:37,200
clusters that their gravity magnifies

15
00:00:41,590 --> 00:00:39,520
and warps light from distant background

16
00:00:43,590 --> 00:00:41,600
objects we call this effect

17
00:00:45,830 --> 00:00:43,600
gravitational lensing

18
00:00:48,229 --> 00:00:45,840
we can map where the dark matter is in

19
00:00:49,670 --> 00:00:48,239
galaxy clusters by observing how the

20
00:00:51,590 --> 00:00:49,680
light bends

21
00:00:53,750 --> 00:00:51,600
gravitational lensing distorts the

22
00:00:56,950 --> 00:00:53,760
appearance of background galaxies into

23
00:00:59,349 --> 00:00:56,960
deformed shapes and elongated arcs

24
00:01:01,830 --> 00:00:59,359
pictures of lensing galaxy clusters are

25
00:01:03,750 --> 00:01:01,840
filled with the smeared images of remote

26
00:01:05,750 --> 00:01:03,760
background galaxies

27
00:01:07,990 --> 00:01:05,760
the higher the concentration of dark

28
00:01:10,789 --> 00:01:08,000
matter in a galaxy cluster the more

29
00:01:13,190 --> 00:01:10,799
dramatic its light bending power is

30
00:01:15,429 --> 00:01:13,200
smaller clumps of dark matter associated

31
00:01:18,550 --> 00:01:15,439
with individual galaxies in the galaxy

32
00:01:21,190 --> 00:01:18,560
cluster create more distortions

33
00:01:23,350 --> 00:01:21,200
in some sense the galaxy cluster acts as

34
00:01:26,149 --> 00:01:23,360
a large lens that has many smaller

35
00:01:28,789 --> 00:01:26,159
lenses embedded inside of it but

36
00:01:31,429 --> 00:01:28,799
strangely astronomers found that three

37
00:01:33,429 --> 00:01:31,439
galaxy clusters used in their study had

38
00:01:35,830 --> 00:01:33,439

concentrations of dark matter that are

39
00:01:38,469 --> 00:01:35,840
so massive that the lensing effects they

40
00:01:40,550 --> 00:01:38,479
produce are 10 times stronger than

41
00:01:42,550 --> 00:01:40,560
originally expected

42
00:01:44,230 --> 00:01:42,560
hubble's crisp images coupled with

43
00:01:46,710 --> 00:01:44,240
observations from the very large

44
00:01:49,830 --> 00:01:46,720
telescope in chile helped astronomers

45
00:01:52,069 --> 00:01:49,840
produce a more accurate dark matter map

46
00:01:54,230 --> 00:01:52,079
by measuring the lensing distortions

47
00:01:57,350 --> 00:01:54,240
astronomers could trace out the amount

48
00:01:59,670 --> 00:01:57,360
and distribution of dark matter

49
00:02:01,510 --> 00:01:59,680
this recent study could signal a gap in

50
00:02:03,749 --> 00:02:01,520
our current understanding of the nature

51
00:02:05,590 --> 00:02:03,759
of dark matter and its properties

52
00:02:07,510 --> 00:02:05,600
it shows us that there's clearly a

53
00:02:09,830 --> 00:02:07,520
missing feature of the real universe

54
00:02:11,990 --> 00:02:09,840
that we simply are not capturing in our

55
00:02:14,550 --> 00:02:12,000
current theoretical models

56
00:02:16,550 --> 00:02:14,560
with studies like this astronomers look

57
00:02:18,630 --> 00:02:16,560
forward to continuing to pin down the

58
00:02:20,630 --> 00:02:18,640
intriguing nature of dark matter to