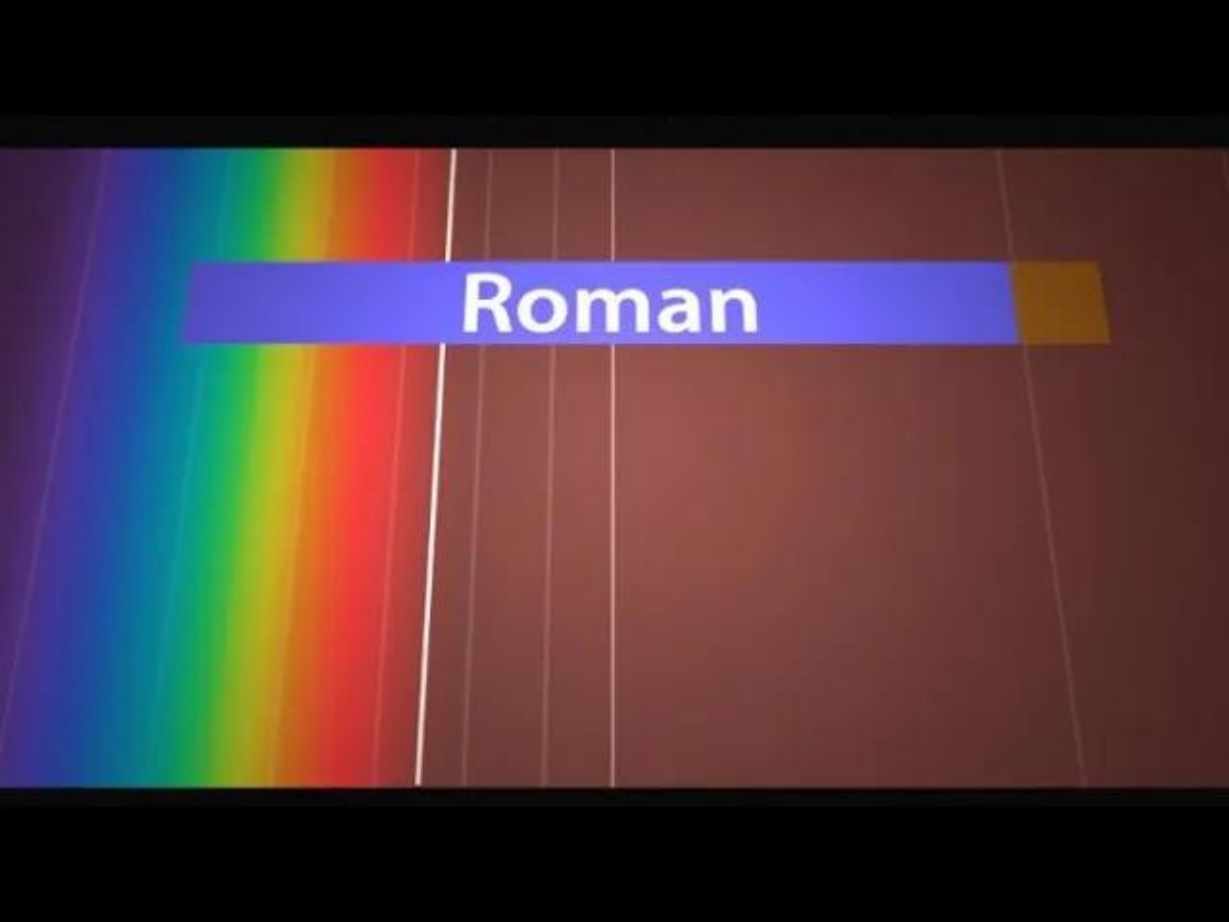
Roman

1
00:00:05,269 --> 00:00:03,350
astronomy is largely the study of light

2
00:00:07,190 --> 00:00:05,279
from distant places

3
00:00:09,589 --> 00:00:07,200
each kind of light carries different

4
00:00:12,230 --> 00:00:09,599
information that adds to our picture of

5
00:00:14,310 --> 00:00:12,240
the universe

6
00:00:16,630 --> 00:00:14,320
the upcoming nancy grace roman space

7
00:00:18,950 --> 00:00:16,640
telescope will detect a key range of

8
00:00:22,230 --> 00:00:18,960
light for studying the universe

9
00:00:24,710 --> 00:00:22,240
visible into near infrared

10
00:00:28,070 --> 00:00:24,720
infrared which starts at a wavelength of

11
00:00:30,070 --> 00:00:28,080
about 0.75 microns will allow the roman

12
00:00:31,990 --> 00:00:30,080
space telescope to make many critical

13
00:00:34,229 --> 00:00:32,000

observations

14
00:00:38,150 --> 00:00:34,239
roman engineers now plan to add a new

15
00:00:39,430 --> 00:00:38,160
filter extending its range from 2 to 2.3

16
00:00:41,910 --> 00:00:39,440
microns

17
00:00:44,069 --> 00:00:41,920
this seemingly small change will make a

18
00:00:47,029 --> 00:00:44,079
big difference

19
00:00:49,510 --> 00:00:47,039
our galaxy the milky way is filled with

20
00:00:52,069 --> 00:00:49,520
bands of dust and gas that block our

21
00:00:53,830 --> 00:00:52,079
view of the stars behind them

22
00:00:56,470 --> 00:00:53,840
part of what makes infrared light so

23
00:00:58,950 --> 00:00:56,480
useful to astronomers is its ability to

24
00:01:00,950 --> 00:00:58,960
travel through this gas and dust

25
00:01:02,310 --> 00:01:00,960
infrared light has a longer wavelength

26
00:01:03,910 --> 00:01:02,320
than visible light

27
00:01:05,910 --> 00:01:03,920
which means it is less likely to be

28
00:01:07,750 --> 00:01:05,920
scattered and absorbed by small dust

29
00:01:09,510 --> 00:01:07,760
particles as it travels over long

30
00:01:12,950 --> 00:01:09,520
distances

31
00:01:15,270 --> 00:01:12,960
upgrading from 2 to 2.3 microns

32
00:01:17,990 --> 00:01:15,280
allows astronomers to see through 2 to 3

33
00:01:20,310 --> 00:01:18,000
times as much dust this opens up much

34
00:01:22,950 --> 00:01:20,320
more of our galaxy to study including

35
00:01:25,670 --> 00:01:22,960
surveys of small dim stars that glow

36
00:01:27,910 --> 00:01:25,680
mostly in infrared

37
00:01:30,550 --> 00:01:27,920
infrared is also good for studying the

38
00:01:32,950 --> 00:01:30,560

more distant parts of the universe

39
00:01:35,190 --> 00:01:32,960
as the universe expands it stretches the

40
00:01:37,190 --> 00:01:35,200
wavelengths of light along with it a

41
00:01:39,590 --> 00:01:37,200
process called red shift

42
00:01:41,190 --> 00:01:39,600
the farther away an object is the more

43
00:01:43,030 --> 00:01:41,200
the light from it has stretched by the

44
00:01:44,710 --> 00:01:43,040
time it reaches us

45
00:01:48,069 --> 00:01:44,720
distant galaxies have all of their

46
00:01:50,230 --> 00:01:48,079
visible light shifted into infrared

47
00:01:52,830 --> 00:01:50,240
stretching over distance makes redshift

48
00:01:55,190 --> 00:01:52,840
one of the key tools for measuring the

49
00:01:56,950 --> 00:01:55,200
universe since astronomers can usually

50
00:01:58,550 --> 00:01:56,960
determine what wavelength they would see

51
00:02:01,270 --> 00:01:58,560
from up close

52
00:02:04,149 --> 00:02:01,280
they can tell how far a galaxy is by how

53
00:02:06,069 --> 00:02:04,159
much the light has changed

54
00:02:08,710 --> 00:02:06,079
closer to home is the search for water

55
00:02:10,869 --> 00:02:08,720
within the solar system water ice

56
00:02:12,949 --> 00:02:10,879
absorbs specific wavelengths of infrared

57
00:02:14,390 --> 00:02:12,959
light providing a fingerprint of its

58
00:02:16,229 --> 00:02:14,400
presence

59
00:02:18,309 --> 00:02:16,239
as telescopes see farther into the

60
00:02:19,510 --> 00:02:18,319
infrared they can see more of this

61
00:02:21,589 --> 00:02:19,520
fingerprint

62
00:02:23,430 --> 00:02:21,599
if objects in the outer solar system

63
00:02:25,990 --> 00:02:23,440

such as rocky fragments in the distant

64
00:02:28,070 --> 00:02:26,000
kuiper belt contain water ice light

65
00:02:30,550 --> 00:02:28,080
reflected off them will have gaps where

66
00:02:32,869 --> 00:02:30,560
the water has absorbed that wavelength

67
00:02:36,070 --> 00:02:32,879
this allows astronomers to detect water

68
00:02:38,710 --> 00:02:36,080
at much greater distances

69
00:02:40,949 --> 00:02:38,720
the nancy grace roman space telescope

70
00:02:42,869 --> 00:02:40,959
will form an unprecedented partnership

71
00:02:44,390 --> 00:02:42,879
with hubble and the james webb space

72
00:02:47,030 --> 00:02:44,400
telescope

73
00:02:49,190 --> 00:02:47,040
with its extremely large field of view

74
00:02:51,589 --> 00:02:49,200
roman is uniquely equipped for large

75
00:02:53,830 --> 00:02:51,599
surveys of the infrared sky allowing

76
00:02:56,390 --> 00:02:53,840
astronomers to identify interesting

77
00:02:58,390 --> 00:02:56,400
targets for more detailed study using

78
00:03:01,670 --> 00:02:58,400
hubble and webb's overlapping wavelength

79
00:03:04,229 --> 00:03:01,680
ranges and smaller fields of view

80
00:03:07,730 --> 00:03:04,239
this collaboration will usher in a new