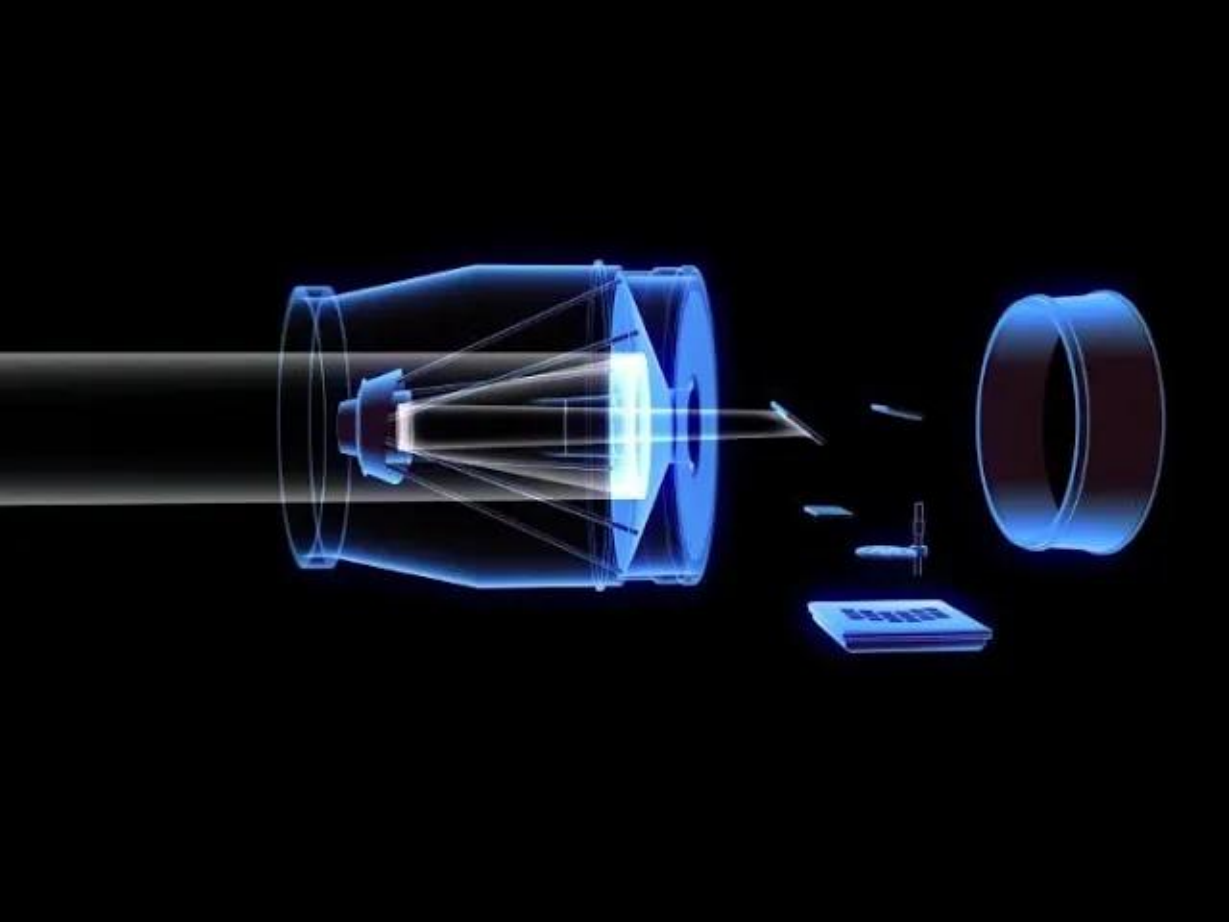

1
00:00:05,269 --> 00:00:03,510
[Music]

2
00:00:08,150 --> 00:00:05,279
the wide field instrument is the heart

3
00:00:09,669 --> 00:00:08,160
of the nancy grace roman space telescope

4
00:00:11,669 --> 00:00:09,679
it is what allows the roman space

5
00:00:14,150 --> 00:00:11,679
telescope to take pictures with the same

6
00:00:17,269 --> 00:00:14,160
detail as hubble but covering an area

7
00:00:19,670 --> 00:00:17,279
100 times larger despite this incredible

8
00:00:21,830 --> 00:00:19,680
power the basic design is the same as

9
00:00:24,150 --> 00:00:21,840
telescopes around the world

10
00:00:25,269 --> 00:00:24,160
light enters through roman's 2.4 meter

11
00:00:27,029 --> 00:00:25,279
aperture

12
00:00:29,349 --> 00:00:27,039
and is reflected and focused by the

13
00:00:31,990 --> 00:00:29,359

curved main mirror which is also the

14
00:00:34,229 --> 00:00:32,000
largest mirror in the telescope

15
00:00:36,389 --> 00:00:34,239
this light is reflected and focused once

16
00:00:38,630 --> 00:00:36,399
more by the secondary mirror

17
00:00:40,549 --> 00:00:38,640
more elements tighten the beam and strip

18
00:00:42,630 --> 00:00:40,559
it of stray light rays before it passes

19
00:00:44,790 --> 00:00:42,640
through the filter wheel

20
00:00:46,470 --> 00:00:44,800
this wheel has a variety of filters that

21
00:00:47,910 --> 00:00:46,480
allow different wavelengths of light to

22
00:00:50,229 --> 00:00:47,920
pass through

23
00:00:52,790 --> 00:00:50,239
it spins from one to another depending

24
00:00:54,950 --> 00:00:52,800
on what the researcher is looking for

25
00:00:57,029 --> 00:00:54,960
finally the focused and filtered light

26
00:00:58,950 --> 00:00:57,039
reaches the focal plane where it creates

27
00:01:00,869 --> 00:00:58,960
an image on the detectors

28
00:01:03,029 --> 00:01:00,879
these detectors use the photoelectric

29
00:01:05,270 --> 00:01:03,039
effect to convert photons into an

30
00:01:07,190 --> 00:01:05,280
electrical signal that is then decoded

31
00:01:09,990 --> 00:01:07,200
into an image

32
00:01:12,230 --> 00:01:10,000
in roman's case there are 18 detectors

33
00:01:15,990 --> 00:01:12,240
allowing it to create 300 million pixel

34
00:01:18,550 --> 00:01:16,000
images of large patches of the sky

35
00:01:21,270 --> 00:01:18,560
the large number of detectors and pixels

36
00:01:23,030 --> 00:01:21,280
gives roman its wide field of view

37
00:01:25,190 --> 00:01:23,040
the size of the mirror and the precision

38
00:01:26,950 --> 00:01:25,200

of its optics gives roman its fine

39
00:01:29,030 --> 00:01:26,960
imaging

40
00:01:31,270 --> 00:01:29,040
this combination of image size and

41
00:01:33,350 --> 00:01:31,280
detail has never been possible on a

42
00:01:35,190 --> 00:01:33,360
space-based telescope before and will

43
00:01:37,830 --> 00:01:35,200
make the nancy grace roman space