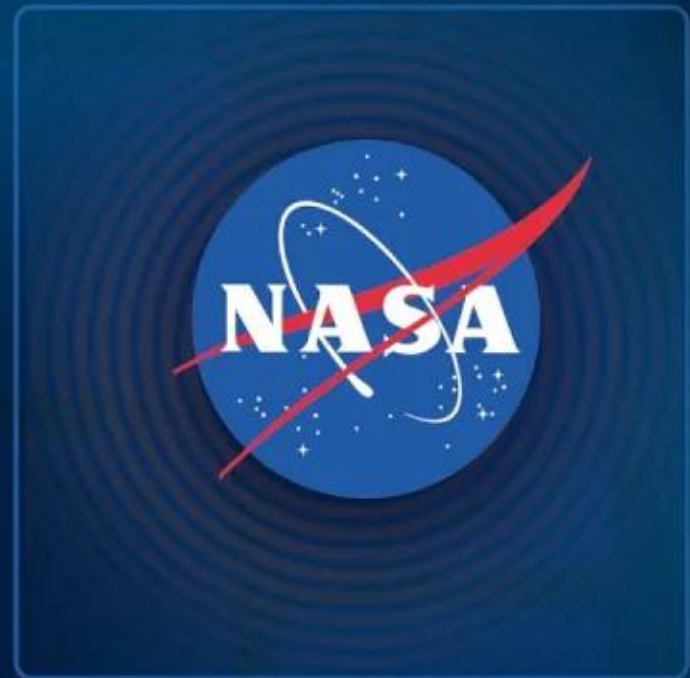


# R.ÖMAN



# CORONAGRAPH INSTRUMENT

1  
00:00:00,000 --> 00:00:02,790

[Music]

2  
00:00:07,269 --> 00:00:05,110

a coronagraph is a way to see distant

3  
00:00:08,390 --> 00:00:07,279

planets hidden by the glare of the star

4  
00:00:10,549 --> 00:00:08,400

they orbit

5  
00:00:12,709 --> 00:00:10,559

the coronagraph reduces the light coming

6  
00:00:15,270 --> 00:00:12,719

directly from the star to separate it

7  
00:00:17,349 --> 00:00:15,280

from the light reflected by the planet

8  
00:00:19,349 --> 00:00:17,359

the nancy grace roman space telescope's

9  
00:00:21,349 --> 00:00:19,359

coronagraph doesn't block the star's

10  
00:00:23,349 --> 00:00:21,359

light with an opaque disc as a simple

11  
00:00:26,230 --> 00:00:23,359

coronagraph might

12  
00:00:28,790 --> 00:00:26,240

instead it uses a combination of discs

13  
00:00:31,269 --> 00:00:28,800

with complex patterns and light blocking

14

00:00:33,590 --> 00:00:31,279

stops to create destructive interference

15

00:00:35,510 --> 00:00:33,600

with the star's light effectively making

16

00:00:38,069 --> 00:00:35,520

it disappear while allowing the light

17

00:00:40,229 --> 00:00:38,079

from planets to pass through

18

00:00:41,910 --> 00:00:40,239

a complicating factor is that the light

19

00:00:43,590 --> 00:00:41,920

picks up small distortions as it

20

00:00:44,630 --> 00:00:43,600

reflects off the telescope's series of

21

00:00:46,470 --> 00:00:44,640

mirrors

22

00:00:47,830 --> 00:00:46,480

and these distortions can reduce the

23

00:00:49,110 --> 00:00:47,840

effectiveness of the destructive

24

00:00:50,950 --> 00:00:49,120

interference

25

00:00:52,950 --> 00:00:50,960

collecting more light increases the

26

00:00:55,270 --> 00:00:52,960

image signal but the planets are still

27

00:00:56,549 --> 00:00:55,280

hidden under blobs of leftover distorted

28

00:00:58,869 --> 00:00:56,559

starlight

29

00:01:01,029 --> 00:00:58,879

to remove these blobs the coronagraph

30

00:01:03,349 --> 00:01:01,039

has special deformable mirrors that can

31

00:01:05,830 --> 00:01:03,359

change shape by using hundreds of tiny

32

00:01:07,190 --> 00:01:05,840

pistons this corrects distortions in the

33

00:01:09,670 --> 00:01:07,200

light beam

34

00:01:11,830 --> 00:01:09,680

as the mirrors deform the blobs of light

35

00:01:13,429 --> 00:01:11,840

slowly begin to disappear revealing

36

00:01:15,190 --> 00:01:13,439

brighter planets

37

00:01:17,030 --> 00:01:15,200

further adjustment brings fainter

38

00:01:19,830 --> 00:01:17,040

planets into view

39

00:01:21,590 --> 00:01:19,840

advanced software processes this data

40

00:01:23,510 --> 00:01:21,600

further improving the contrast and

41

00:01:25,510 --> 00:01:23,520

clarity of the image

42

00:01:27,510 --> 00:01:25,520

this processing makes objects more than

43

00:01:28,710 --> 00:01:27,520

a billion times fainter than the star

44

00:01:31,109 --> 00:01:28,720

visible

45

00:01:32,870 --> 00:01:31,119

as a result the roman space telescope

46

00:01:35,510 --> 00:01:32,880

will provide the first look at