
Black Hole

1
00:00:00,434 --> 00:00:04,771
On November 11, 2019, students
and researchers working on

2
00:00:04,771 --> 00:00:09,610
NASA’s OSIRIS-REx mission made
an unexpected observation – the

3
00:00:09,610 --> 00:00:14,147
detection of a black hole 30,000
light years away. The detection

4
00:00:14,147 --> 00:00:19,119
was made by an instrument about
the size of a shoebox. This is

5
00:00:19,119 --> 00:00:22,956
REXIS, the Regolith X-Ray
Imaging Spectrometer. It was

6
00:00:22,956 --> 00:00:26,660
proposed and built by teams at
MIT and Harvard and was

7
00:00:26,660 --> 00:00:29,830
originally designed to determine
the abundance of elements on the

8
00:00:29,830 --> 00:00:33,800
surface of asteroid Bennu. REXIS
contains a mask with a known

9
00:00:33,800 --> 00:00:37,704
pattern of open and closed
holes. As X-rays pass through

10
00:00:37,704 --> 00:00:41,008
these holes the mask’s shadow
shifts as it hits the

11
00:00:41,008 --> 00:00:44,278
sensor. Based on this shifting,
scientists can determine where

12
00:00:44,278 --> 00:00:47,915
the X-ray signals came from.
While OSIRIS-REx was observing

13
00:00:47,915 --> 00:00:50,951
the asteroid several million
miles from Earth, it detected

14
00:00:50,951 --> 00:00:54,521
X-rays radiating from a point
off the asteroid's edge – at a

15
00:00:54,521 --> 00:00:58,525
place where no previous object
had been catalogued. This

16
00:00:58,525 --> 00:01:02,496
glowing object turned out to be
a newly flaring black hole X-ray

17
00:01:02,496 --> 00:01:06,099
binary. As matter from an
orbiting star is pulled onto a

18
00:01:06,099 --> 00:01:09,202
spinning disk surrounding the
black hole, an enormous amount

19
00:01:09,202 --> 00:01:12,539
of energy, primarily in the form
of X-rays, is released in the

20
00:01:12,539 --> 00:01:16,743
process. This black hole was
discovered just a week earlier

21
00:01:16,743 --> 00:01:20,614
by Japan’s MAXI telescope on the
International Space Station.

22
00:01:20,614 --> 00:01:24,017
Also on the ISS, NASA’s Neutron
Star Interior Composition

23
00:01:24,017 --> 00:01:29,056
Explorer telescope (NICER)
identified the X-ray blast a few

24
00:01:29,056 --> 00:01:32,526
days later. Earth’s protective
atmosphere shields our planet

25
00:01:32,526 --> 00:01:35,963
from X-rays, so these types of
blasts, like the one emitted

26
00:01:35,963 --> 00:01:39,099
from this newly discovered black
hole, can only really be
observed from

27
00:01:39,099 --> 00:01:42,669
space. And for the first time,
we made this detection from