



1  
00:00:08,190 --> 00:00:04,120

Music

2  
00:00:08,210 --> 00:00:12,210

Narrator: This is the supermassive black hole at the

3  
00:00:12,230 --> 00:00:16,300

center of NGC 4151. The dark object

4  
00:00:16,320 --> 00:00:20,400

in the middle is the black hole. Surrounding it is a flattened cloud of dust

5  
00:00:20,420 --> 00:00:24,420

and gas, called an accretion disk. Recently,

6  
00:00:24,440 --> 00:00:28,470

scientists using the XMM-Newton X-ray satellite showed that a mysterious

7  
00:00:28,490 --> 00:00:32,560

source of X-ray flares actually lies high above the disk.

8  
00:00:32,580 --> 00:00:36,590

About half an hour after each flare, the inner accretion disk lights up with an

9  
00:00:36,610 --> 00:00:40,660

X-ray "echo." The delay is caused by the time it light from the flare to reach

10  
00:00:40,680 --> 00:00:44,770

the disk. This is first clear measurement of the effect, and demonstrates

11  
00:00:44,790 --> 00:00:48,800

that the flaring X-ray source lies well above the disk. With flares

12  
00:00:48,820 --> 00:00:52,870

serving as "flash-bulbs," future X-ray telescope missions will be able to use

13  
00:00:52,890 --> 00:00:57,050

their echoes to precisely map the environs of distant black holes.