

# What is X-ray Spectroscopy? Script

## Clip from *Building the Coolest X-ray Satellite*

### Video

KEVIN OC  
TEXT: KEVIN'S TITLE  
GRAPHIC: X-RAY SPECTRUM PLOT  
ANIMATION SHOWING THE ELECTROMAGNETIC SPECTRUM

### Audio

KEVIN: The XRS is primarily a spectrometer. And that is to say, it looks at the spectrum of photons that comes from a given source. The spectrum will tell you how hot it is, what it's made of, how fast it's moving. So, if you put light through a prism, you get a spectrum of colors – same thing is true of x-rays. There's higher energy – shorter wavelength and lower energy – longer wavelength.

### Video

ANIMATION OF ASTRO-E2 IN SPACE  
TEXT: WHAT IS X-RAY SPECTROSCOPY?

### Audio

NARRATIVE: How can x-ray spectroscopy help us understand an x-ray source in space? Think about it like this.

### Video

ILANA OC  
TEXT: ILANA'S TITLE  
CLIP OF WHITE BOARD DRAWING OF STADIUM AND BALLS FLYING OUT  
TEXT: GAME=PHENOMENON  
TEXT: BALLS=PHOTONS  
ANIMATION OF CHANDRA X-RAY TELESCOPE IN ORBIT  
IMAGES OF SUPERNOVA REMNANTS

### Audio

ILANA: So, there is a stadium and people are playing different games in it, and they are using different balls. And the guy or the woman is standing there outside, and then from time to time they get a ball and they look at the ball and they know what game is played. Spectroscopy is this: Is the ability of telling what are the different phenomenon that occur, say your stadium is like a black hole or near a black hole. And each, let's say each phenomenon in physics is going to be a different game. And so you want to know what are the games that are played, so you want to get the balls. Okay? So, let's say that you get a football and you say okay well they are playing football – well you don't know where they are playing football. So now you need something, which is a good imaging, which is Chandra. Chandra is going to tell you, Oh I know, because if I

do an image of the stadium, I know where they are playing football, they are playing football right here in that corner of the stadium.

Video

CLIP OF XRS IN THE CLEAN ROOM

Audio

NARRATIVE: The x-ray spectrometer is so sensitive it can detect extremely subtle differences between individual x-ray photons.

Video

CLIP OF ILANA PLAYING FOOSBALL

ILANA OC

CLIPS OF A PING PONG BALL AND BURNED FOOSBALL

GRAPHIC: FOOSBALL, BURNED FOOSBALL, PING PONG BALL

Audio

ILANA: If you play foosball like I do, which is a lot. I'm a pro; I'm a total pro. You can actually play foosball with a ping pong ball if you don't know how to play foosball, but you can also play foosball with a real foosball which you have burned, so that they have a better, you know, a better grip. This is a trick for pro only. The game is really, to have an instrument, which is good enough to tell you the difference between the burned foosball, the non-burned foosball, and the Ping-Pong ball. Astro-E2 is going to tell you the difference between those 3.