

MITOCW | Investigation 6, Part 2

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MARK We live-- this is a cartoon of what our galaxy looks like. We live here. The center of our galaxy is there. Some of these objects-- 4U1822 is right here. [INAUDIBLE] is over there. The Crab Nebula's there. The Orion Nebula's inside there. And that other neutron star that we looked at is really close to us.

But now-- and remember we said if our solar system was the size of a quarter, how large would the galaxy be?

AUDIENCE: North America.

MARK OK, so [INAUDIBLE], can you hold that up? So our own galaxy would be the size of North America. What we're going to think about now is other galaxies, galaxies outside of our own. And actually, [INAUDIBLE], if you could stand up and move to the other end of the room?

I want you guys just very, very briefly to discuss with your groups if this was our galaxy, where do you think the next galaxy would be? If our galaxy was actually this size, right? So think back to this idea that we had before. If the solar system was one quarter, where would the next quarter be? Where did we say it was?

AUDIENCE: [INAUDIBLE]

MARK Like a half mile away, on the other side of campus. But if our galaxy were this big, where would the next galaxy be? Where should be tell [INAUDIBLE] to go? If [INAUDIBLE] was the Milky Way galaxy-- actually, here, I'm going to give you the [INAUDIBLE] Galaxy. This is bigger.

So notice how wide this galaxy is. This galaxy is about the same width. The next galaxy away from us is about 20 times the width of one galaxy.

AUDIENCE: [INAUDIBLE].

MARK So we were all thinking they were far away, like on Mars, right? But if this is one width of a galaxy, one linear width, 2, 3, 4, 5, 6, 7, blah, blah, blah, all the way, like Peter said--

PETER: Told you!

MARK To probably the other side of the room.

HARTMAN:

[LAUGHTER]

So if that is our Milky Way galaxy, all the way on this side of the room would be where the Andromeda Galaxy is. And yes, they are getting closer to each other. But we'll have to wait to learn a little bit more about how fast galaxies move before we can figure out how long it's going to take them to collide. Good, Peter. Nice, well done.

[APPLAUSE]

Nice guess.

[INTERPOSING VOICES]

So why was that surprising? Why did everybody guess these big huge distances?

AUDIENCE: What's that?

MARK Why did everybody else guess these big huge distances?

HARTMAN:

AUDIENCE: Because--

[INTERPOSING VOICES]

AUDIENCE: [INAUDIBLE]

[LAUGHTER]

MARK Same thing happened with the quarter, what do you mean?

HARTMAN:

AUDIENCE: Because anyone would guess, like, I'd say 2 inches, \$0.50. And all the people were like, oh no, you're to Mars. And somebody say it's over there.

MARK There's a stock answer for everything, I guess.

HARTMAN:

[LAUGHTER]

AUDIENCE: If you come all the way, I was like, half a mile?

MARK Yeah.

HARTMAN:

AUDIENCE: And I was like--

MARK OK. Stars in a galaxy are relatively far apart, because they're so small compared to how far apart they are.

HARTMAN: Galaxies, on the other hand, are large. They're big huge things. Relative to the size of a galaxy, the space in between galaxies is not so much.

Now David told us this morning that we're part of a local cluster of galaxies. So yeah, the Andromeda Galaxy is fairly close to us. If you're in a cluster of galaxies, the galaxies are going to be fairly close. If we're talking about the distances to further galaxies, it may not be quite as close.

But most galaxies have at least a couple of other galaxies around them. In our local group, there's a decent number of galaxies. It's not huge, it's not more than six to 10, is that about right, Peter? The number of galaxies in our kind of local group?

PETER: That sounds right.

MARK It sounds about right. So there's about six galaxies that are hanging out with us together. So--

HARTMAN:

AUDIENCE: Bless you.

MARK If the galaxy was the size of a poster, where's the next galaxy? 20 galaxy diameters away. 20 galaxy diameters
HARTMAN: away, all right?

AUDIENCE: 35.

MARK Is it 35?

HARTMAN:

AUDIENCE: There's 35 in the local group.

MARK Oh, there's 35 galaxies? OK. And there are 35 galaxies in our local group of galaxies. All right?

HARTMAN: