MARK HARTMAN: So what are the parameters of this system? If over there, the parameters for our lighthouses were like the number of balls and maybe the luminosity of the bulbs, what are our parameters for this system? OK, it could be the gravitational force that the companion star feels. Where does that gravitational force come from?

AUDIENCE: The compact object.

MARK HARTMAN: OK. What about the compact object allows it to have a gravitational force?

AUDIENCE: That is gravitational force maker.

MARK HARTMAN: It's a gravitational force maker, which we call mass.

AUDIENCE: Yeah.

MARK HARTMAN: Anything that has mass produces gravitational force, so one of the parameters is the mass of the compact object.

What's another parameter of this whole system? And remember when we say system, we're just meaning a bunch of parts, maybe different things, that kind of work together.

AUDIENCE: The mass of the other object.

PROFESSOR: OK, the mass of the companion. All right. Because if the mass of the companion is different, we're going to have a different gravitational force that's pulling them, and that could change something about how that companion orbits. Chris?

AUDIENCE: The size of the companion.

PROFESSOR: The size of the companion, right? Let's think about maybe the radius of the companion. How big is that? I mean, we talked about its mass. We could also talk about its size. So I'll put down, here, radius of companion. What else? Steve?

AUDIENCE: Luminosity.

PROFESSOR: OK, the luminosity. And it could be X-ray luminosity of which one?

AUDIENCE: Luminosity of the [? companion star. ?]

PROFESSOR: OK, we know that only the compact object produces X-ray, we think.

AUDIENCE: [INAUDIBLE]

PROFESSOR: What else? We have the radius of the companion here. What else could we say?

AUDIENCE: The radius of the compact object.

PROFESSOR: Radius of companion and then also of a compact object.

AUDIENCE: The linear size.

PROFESSOR: OK, so the linear size of what?

AUDIENCE: Of the compact object.

PROFESSOR: OK, if we knew the radius of the compact object, that's kind of like saying that is the linear radius, right? But that's a good point. I mean, we could say-- yeah, the radius of the companion, the diameter of the companion, the volume of the companion. But if we know the radius, we can figure out those other ones. So we want to think about it as what are the most important parameters of this model? Anything else? [? Island? ?]

AUDIENCE: Accretion?

MARK HARTMAN: OK, accretion because remember we left this out-- so what about accretion?

AUDIENCE: [INAUDIBLE]

MARK HARTMAN: OK, so if we're talking about there's this accretion stream, we could maybe say the mass that is accreted, and that could be either a total amount of mass or maybe-- astronomers actually use the amount of mass per year that is transferred from one object to the other. So the mass that is accreted, or maybe its rate of accretion.

As it turns out, the rate of the accretion is actually directly related to the luminosity of the object, so that's a good point. We left that out, so now we put that back in. Bianca, were you going to say something?

AUDIENCE: Distance, maybe?

MARK HARTMAN: What distance?

AUDIENCE: Between the compact object and the companion star.

MARK HARTMAN: OK, so the distance between the compact object and the companion star, that is a distance, but it's also the radius of the orbit. So we could say radius of the orbit. That's a lot of parameters.

AUDIENCE: That's too many.

PROFESSOR: It's too many? Chris is right. There are too many, because I can use this same drawing. I could change any one of those. I could change all of those, and the predictions for things that I would expect from this system would be different.

We have a model for an X-ray binary star, but if we really wanted to figure out for our specific situation, we would have to figure out each one of these things to be able to specify what's really going on there. The X-ray binary project is going to go through and do this. You're going to either have assumptions or actually make predictions of what all of these are.