

Episode 59: Saturn Roundup

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- Pamela: Welcome to Slacker Astronomy; a podcast about astronomy and just about anything else that floats over our heads.
- Travis: Each week we bring you a recent news event from the world of astronomy. And when there is nothing new to report, we'll obsess over the new trend for rings to appear everywhere.
- Pamela: First there was this new trend in giving women necklaces that have a big O of diamonds. This trend started at Christmas and has been confusing me ever since.
- Travis: And then there was discovery of post holiday ring around the waist.
- Pamela: And the post holiday weight gain reducing exercise caused ring around the T-shirt collar.
- Travis: And with the changing of spring into summer, we saw the tan ring around the wrist from my watch.
- Pamela: And mine... And let's not forget about the newest ring - end of summer camping ring around the bathtub.
- Travis: No, here I have to disagree – There is an actually even more important new ring development.
- Pamela: Really? What did I miss?
- Travis: Oh well, Cassini.
- Pamela: OH! Shoot, I'd totally forgotten – it just turned 2 sometime recently, didn't it?
- Travis: Yup. Cassini first arrived at Saturn on July 1st 2004. This little craft is slated to keep on plugging away until the summer of 2008, and it is still regularly turning out new results about Saturn, its moons, and ...
- Pamela: No you don't have to say it, let me guess. It's still turning out new results about Saturn's rings.
- Travis: And I thought your weren't paying attention to planetary papers this ring filled season.
- Pamela: Well, maybe I wasn't giving them my full attention, but I at least saw the titles. Like wasn't there recent evidence that Enceladus's water geyser's are the source of Saturn's really thin E-Ring?
- Travis: You have been reading, but that is actually old news. Last July, observers using the Cassini cameras caught Enceledus in the act of repeatedly erupting

and spewing material into space. It's geysers were quickly linked to the E-ring after scientists observed that the E-ring and material around the icy moon are the same.

Pamela: No, I know I saw a recent story about the link between Enceladus and the E-ring. Hold on, let me search [TYPING] Okay – here it is. On July 5, 2006 ...

Travis: ...which is admittedly still not that recent, but was still this summer at least ...

Pamela: On July 5, 2006, CICLOPS and the Space Science Institute in Boulder announced that the E ring was observed to be double layered. When viewed edge on, the rings were much thicker 500-1000 km outside the plane of the rings than in the plane of the rings.

Travis: Now that result, I have to admit that I missed! So, you're telling me the particles tended to orbit above or below the rest of the rings? How on Earth does that happen?

Pamela: Well, first off, it's how on Saturn does that happen, but... well, it's not that the orbits of the particles are parallel to the rings but higher or lower, but rather, the particles are on inclined orbits.

Travis: So they have orbits that cross the plane of the rings, but because most of the orbit is above or below the ring-plane, the particles spend most of their time above or below the ring plane.

Pamela: Exactly. And exactly how they ended up in these inclined orbits is still being debated, but there are currently two leading theories.

Travis: Two? But it seems obvious. If Enceladus is ejecting the particles with some finite velocity out of the disk, it seems natural that this would cause the particles to land in inclined orbits.

Pamela: Well, that is one of the theories, but the thing is, what happened to particles that might have been ejected into the plane of the rings. How did they end up inclined, if they existed?

Travis: Um, well, ... Aren't you the astronomer?

Pamela: Well, yes... But you were doing so well I thought you might have the answer.

Travis: Well, I don't.

Pamela: Well, I do, because I actually read this story. It turns out that Enceladus's passage through the plane of the rings can stir up particles and bump them into inclined orbits. Basically, what particles the moon doesn't spray into inclined orbits, it just might gravitationally scatter into inclined orbits.

Travis: Nice trick. That moon seems to be better trained than your two dogs?

Pamela: Trained? I wouldn't go that far. The moon and the dogs both scatter stuff in all directions, and they both have their own, um, water sprays, but... Hey, can the moon roll over like Leah.

Travis: Yes it can.

Pamela: A moon can roll over?

Travis: So apparently you aren't reading all the paper titles.

Pamela: A moon rolls over?

Travis: Yup. On May 31...

Pamela: Which is even older than the paper I mentioned

Travis: Yeah, yeah, yeah yeah. On May 31, 2006, folks over at the Jet Propulsion Laboratory announced that Enceladus appears to have rolled around to get its hotspot and geysers to its South Pole.

Pamela: Yeah, it is a bit odd that the little moons warmest zone is at what should be one of the coldest places on the moon. It's sort of like discovering that Death Valley, high temps and all, are located in the Antarctic wastelands.

Travis: Yeah – it just seemed odd, so the scientists did all sorts of modeling to figure out what happened. What they figured out is the region with the hotspot and the geysers was lower mass than other regions. Rotating bodies like bowling balls don't like to have their low mass regions on the equator of the rotation, so they rotate to get the low mass region on a pole.

Pamela: Bowling balls don't exactly have poles, but I think I get what you mean. When you release a bowling ball, it starts out with the holes going around to the floor and then around to face the ceiling, but the ball will rotate so the holes are constantly facing straight out the rotational axis at one of the neighboring lanes.

Travis: And the geyser on Enceladus is a bit like the finger holes on the bowling ball.

Pamela: Didn't something similar happen maybe happen to Uranus's moon Miranda?

Travis: That's what the press release I read said. Bowling Balls, Miranda and Enceladus. They all may roll over just the same, and more consistently than your dogs.

Pamela: Okay okay, maybe the moon does have a few neat tricks that the mutts just can't consistently reproduce. But it seems that we have strayed from our rings around everything theme for the day.

Travis: Hmm, rings. There must be at least one more thing we can say about Saturn's rings that is new and novel.

Pamela: What about the arc in the G-ring?

Travis: The one that looks like the arc in Neptune's rings that is associated with Galatea?

Pamela: That's the one. On July 5...

Travis: Wait, wasn't that the same date as the other announcement you talked about...

Pamela: Um, well, err, <mousy> yes?

Travis: So, you read all the releases on one day and ignored all the rest?

Pamela: NO – no, I read them regularly. Well, somewhat regularly, um, err...

Travis: You read them once a year on July 5?

Pamela: Well, it was summer and all, and... Yea, this summer I read about planets on July 5th. BUT there were two good releases on July 5th! This one talked about how new, hi resolution images of the rings show that there is an arc of material looping around the inside edge of the G-ring. This wasn't the first time the arc has been seen either. It also showed up in images from May 2005. This reimaging means the arc is real and stable, and not some weird transitory pretty thing.

Travis: Pretty? Did you see the images? You'd have to be a professional planetary scientist to see an arc, and you, my podcasting friend, are a variable star astronomer, NOT a planetary scientist.

Pamela: Yeah, but the idea of an arc is pretty. It is drawn out of the plane of the rings by Saturn's moon Mimas, and you can see some sort of a feature in the images, even if it doesn't look very dramatic to the untrained eye.

Travis: Well, if you are looking for drama, look at Cassini's movies of Saturn's dancing moons. There are some of the most amazing video clips of Saturn's moons passing one another and the rings on the CICLOPS site. I'll link the movies into the website, www.slackerastronomy.org.

Pamela: But that's not dramatic science. That's just dramatic looking.

Travis: And some days dramatic looking is all I'm looking for. And this just might be one of those days. If only it weren't for all the cool science associated with Enceladus ice geysers... Hmmmm, but that is old science, and the images are new potential science... Yeah, today my happiness just requires dancing moons... Mmmmm, dancing moons.

Pamela: Um, Travis... Do we have any more show left?

Travis: Not really. Just dancing moons. That's enough.

Pamela: Than we might want to wrap this show up.

Travis: Wrap it up with a pretty bow on top? That's kind of hard to do with audio, but let's give it a try. First though, weren't there some announcements Aaron reminded us we needed to make?

Pamela: OH – yes. Our paypal account is low so it is time to beg. If you love us, please send us a dollar. If you really love us, we'd love it if you sent us more than a dollar.

Travis: In theory, about 14,000 of you are listening. If all 14,000 of you sent us just ONE dollar, we could pay our internet service for 90 years and have enough left over to all go to AAS in January.

Pamela: Now, in the month of June, we received just 2 donations, for which we are very grateful, however, can you spread the cost of our internet more evenly

among yourselves? 2 people shouldn't be paying the bills for 14,000 of you.

Travis: So show some slakers some love, and send us just one little dollar. Please?

Pamela: Please with sugar and whipped cream on top?

Travis: And while Oceanside Photo and Telescope is going to continue to be our sponsor, we'd love to add more pretty add graphics to our side bar. Want to advertise your company, university, or program? Contact us at info@slackerastronomy.org All advertising profits go to sending us to conferences or buying equipment.

Pamela: So basically, we're feeling a bit broke. We could use your help. Donations can be sent via our paypal using the donate button on our home page.

Travis: And while you are sending us money, check out show notes, past shows, and random astronomy related stories. All this and more can we found at www.slackerastronomy.org.

Pamela: And that should be a wrap.

Travis: I don't see the bow.

Pamela: Um... Yeah. I'm not going there. Clear Skies, and Clear Bandwidth. This is Pamela Gay tying a bow around Travis's neck with the help of Silent Aaron.

Travis: Thanks for listening. This has been Slacker Astronomy, a podcast for you, for fun, for the voices in our heads.