

Hercules: Cosmic Background

Intro

Jordan: Hi, I'm Jordan.

Kit: And I'm Kit.

Jordan: Welcome to Starry Time, where stars plus lines

Kit: equal stories.

Jordan: For next month, we will be exploring the constellation Hercules. Just Hercules.

Kit: Yeah. Um, no further descriptor for Hercules. Uh, so sometimes for Andromeda, we have the chained maiden. Sometimes for Hercules, they say things like the hero, but, uh, sometimes just Hercules. So this week's episode will be all about the astronomy and other cosmic background of Hercules. Just Hercules.

Jordan: Just Hercules. Kit, before we move on, we should probably address the hero in the room.

Kit: Uh, if you must.

Jordan: If you've been listening to the last few episodes, you were probably expecting this month's focus to be on Perseus. Instead, we're discussing Hercules. And the truth

is, honestly, we needed a break from this whole melodrama. The Cassiopeia, Cepheus, Andromeda, Perseus story. It was getting a little bit much.

Kit: But don't worry, there is plenty of drama in the Hercules story, which we'll discuss in great detail in our myths and constellations episode next week.

Jordan: Exactly. And we will eventually return back to Perseus this season after we've had a little break.

Kit: Yeah, we won't leave you hanging.

Background

Jordan: All right, so back to Hercules. He is a demigod hero of Roman mythology. In Greek mythology, this hero is known as Heracles.

Kit: Perhaps unsurprisingly, given this background, uh, this IAU recognized constellation was identified in the second century by Ptolemy, making it a member of the great

Jordan: great, great, great, great, great ...

Kit: 48 constellations catalogued in the Almagest.

Jordan: Fittingly, Hercules is a whopping 1225 square degrees, which makes it the fifth largest IAU recognized constellation.

Kit: And it's the only constellation we've covered so far that is larger than Virgo.

Jordan: And you can learn all about Virgo in our episode from season one. Get into the back catalog,

Kit: share it with a friend.

First Impressions and Where to Find It

Jordan: Definitely. All right, Kit, so we're talking about a big constellation here. Let's talk about where to find it in the night sky and what it looks like. What were your first impressions of this constellation?

Kit: So, looking at it, I kind of got, like, antenna alien with little arms, and, like, um, and, uh, Eva from wall -e. Like a floating body vibe out of it. If I flipped it around a little bit, I could sort of see a running figure with, like, very disproportionate, asymmetrical arms. Uh, so I kind of got, like, vaguely human alien- y. How about you? What did this one look like?

Jordan: Yeah, to me, it looked like a headless long jumper.

Kit: Okay

Jordan: Um I got. I got the arms, I got the legs. They seem to be like in, uh, like Michael Jordan flying through the air mode. Um, but then just, uh, no head.

Kit: Right.

Jordan: So in that sense, maybe I need to reorient it. But, um, besides that, again, it kind of just looks like a box with. With lines coming out of it. Not a very helpful description, I don't think.

Kit: Uh, luckily, it's visible in the northern and southern hemispheres from positive, uh, 90 to negative 50 degrees latitude. And in the night sky, it has a right ascension of 17 hours and a declination of positive 30 degrees.

Jordan: And if you don't happen to be an expert at using the equatorial coordinate system, there are a few other ways to find this constellation. For instance, you can look for the bright stars Vega and Arcturus, and you'll find Hercules between them.

Kit: Mhm. Or you can look for the surrounding constellations, which include Ophiuchus and Sagittarius.

Jordan: Both of which we covered in season one.

Kit: Mhm. It's also near Corona Borealis, which we'll cover later this season, as well as Lyra and Draco.

Jordan: Hercules is visible between April and November in the northern hemisphere and between June and September in the southern hemisphere, with July being a good time to find Hercules high in the night sky.

Brightest Star

Kit: So we now know what it looks like and roughly how to find it. Um, so let's talk a little bit more about the stars of this constellation. Hercules has an imposing 22 main stars in the constellation, but the

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Kit: number is obviously compensating for something because none of these stars are brighter than a visible magnitude of positive 2.5.

Jordan: Brutal. A lot of little ones here. As a way of a reminder, our sun has a visible magnitude of -27 because, well, it's close. And on this scale, the negative numbers are brighter. The full moon has a visible magnitude of around negative 13. The star Antares, which we discussed in our episode on Scorpius, has a magnitude of around positive one. And the limit for the unaided eye is between plus six or plus seven. But you'll only be able to see that in pretty dark areas.

Kit: So given all this, uh, where are you putting the over under on Bayer's chances of getting the brightest star right?

Jordan: Very low. Incredibly low. There's 22 stars. None of them are very bright. Um, it's a big constellation. I think there's a lot of room for error here.

Kit: So the brightest star in this constellation is kornephoros, meaning club bearer. It also has another name, which is Rutilicus, meaning or actually not meaning, it's a mistranslation of the latin word meaning armpit. And it holds the Bayer designation of.

Jordan: Drumroll, please. Holding my breath. Is it alpha?

Kit: Beta, uh, Herculis.

Jordan: Oh, so close, Bayer. And yet not unexpected to see you miss this one. I'm honestly surprised you even got within one of the brightest. So, yeah, streak's over.

Kit: But, you know, this is the Bayer that I know and tolerate. So Beta Herculis is part of a binary system with the larger star being a white to yellow giant star found in the shoulder of the constellation. It's about 139 light years away and has an apparent magnitude of 2.81. But this varies somewhat. It's a variable star system. So, uh, as a giant star it's starting to move down the path off the main sequence and it will eventually end up as a white dwarf star

Jordan: Much like our sun.

Kit: Precisely. So that's the brightest star in the constellation.

Bayer's Variable Star

Now let's move to our next segment, Bayer's Variable star where we follow the Greek alphabet to learn more about the Bayer designated stars in the night sky.

Jordan: All right, how far do we get so far? Are we on Iota Herculis for this one, Kit?

Kit: Yep, that's right. We're moving right along through the alphabet

Jordan: Perfect. So Iota Herculis is a multiple star system. According to Dr. Kaler's website, one of the companion stars is estimated to be 18,000 AUs also known as astronomical units away from the main star. Meaning this orbit would take a million years.

Kit: Yeah, it's a really long orbit. In our solar system, the longest planetary orbit is for Neptune, which is our favorite planet and full of toots.

Jordan: Neptoots.

Kit: Yeah, forever. toot-toot. Uh, so Neptune is located about 30 au from the sun and it takes 165 Earth years to orbit.

Jordan: All right, but what about Pluto?

Kit: Well, Pluto is obviously farther. Uh, it's on average 39 au from the sun, but it gets as close as 30 au and as far as 49 au because it has that sort of oval orbit. Um, so Pluto actually takes 248 years to orbit our sun.

Jordan: So, very close to Iota Herculis's orbiting star. Very close.

Kit: Yes, it's very, very similar. Uh, but I will say that back in 2016, there was a discovery of a planet called L 91, which orbits our sun between 50 and 1430 au. And it takes about, uh, 20,000 years. But that's, that's super far out there and it doesn't even come close to Iota Herculis.

Jordan: Iota Herculis's system has something special, I guess. The system itself is

located 455 light years from Earth and its largest star is a B type subgiant with an apparent magnitude of 3.80 and an absolute magnitude of negative 2.11. And around about 9000 or 10,000 bc, this was the pole star And due to the precessional path, it will be the pole star again in around 15,000 AD.

Kit: Wibbly

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Kit: wobbly, timey wimey, spacey wacy.

Jordan: Exactly. And those are some fun facts we have about Iota Herculis. So let's take a quick break and then return for Gold star

Gold Star

Welcome back. This segment is called Gold star In this segment, we alternate picking the star or space object in our constellation of the month that captures our mind, our hearts, our souls. What was your illustrious pick this month, Kit?

Kit: Well, as usual, I like to shoehorn a few things that I didn't pick in, but I feel very conflicted about not picking before revealing our newest Gold star club member.

Jordan: Who's the rule breaker now, Kit?

Kit: I only break rules for science.

Jordan: Excuses, excuses.

Kit: Um, anyway, uh, some of the things that caught my eye were M 13, also called the Hercules globular cluster, which is basically just a, uh, famous globular cluster that's a common astrophotography target and is the destination of the Arecibo message.

Jordan: Interesting. And the Arecibo message was the interstellar radio message that we sent in 1974, had some basic information about humans and Earth. And surely it will have no long term, horrible consequences for us because we sent it out.

Kit: Right. But to be fair, m 13 is, like, 25,000 light years away, so it's going to take a while to get there.

Jordan: Gonna take a hot minute. All right, any other favorites that didn't make the cut?

Kit: Well, I had to include this one because its name is sn 2018 cow.

Jordan: moo.

Kit: So, uh, go check out the cow asterism, if you haven't listened to that one already.

Jordan: It was a really great one. One of my favorite creature corners.

Kit: Definitely. So, um, sn 2018 cow is a favorite because of that preface prefix, uh, I should say, sn. It stands for supernova. And this supernova was ten to 100 times more powerful than a normal supernova and likely formed a black hole, or, um, was itself a chaotic neutron star or it was created, um, from a white dwarf being eaten by a Black

hole.

Jordan: Kit, these are all your favorite things. Cows, black holes. And you're telling me this wasn't the winner? Are you feeling okay? been an okay month for you?

Kit: Well, it was a very. It was a top contender, but ultimately, I had to go with something more strange and weird, something that we hadn't talked about on the pod yet.

Jordan: Ooh, intriguing. Something new. Okay.

Kit: So I decided to go with the Hercules Corona Borealis Great Wall.

Jordan: Wow. That's an incredible proper noun, maybe, not as good of a name as cow. Um, or zero one eight cow. All right. What's this thing? Surely it can't just be a wall in space.

Kit: Well, uh, so it's basically a galaxy filament that is 10 billion light years in length that was discovered in 2013.

Jordan: Wow. Holy cow. Okay, tell me more.

Kit: So, the scale that we're talking about is 10% of the diameter of the entire observable universe.

Jordan: Oh, wow.

Kit: Yeah. So this is the largest known structure in the observable universe, but it's not

really a single object or a literal wall. Instead, my understanding is that this term Galaxy filament is describing a network of galaxies and Galaxy clusters, along with dark Matter and other cosmic Matter that are gravitationally interconnected. So that's what we're talking about here, these interconnected, um, Space objects.

Jordan: Okay. Wow. So they discovered in 2013. How did they discover it?

Kit: So I was actually discovered, um, due to a higher than expected level or amount of gamma ray bursts.

Jordan: Oh, just like the incredible hulk of Galaxy filaments here. I understand.

Kit: I guess so. Um, it's really interesting, though, because even though this structure is called the Hercules Corona Borealis Great, wall. It is kind of misleading because it covers more than 20 constellations in the night sky, um, although they're all in the northern hemisphere. But this thing is big.

Jordan: It's massive. 10% of the observable universe. Yeah, they could have given it a lot of different names. I would have just called it the big, big constellation wall. But, yeah, Hercules

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Jordan: Corona Borealis does have a nice ring to it. Um, I don't know why exactly they chose that name, but they could have done worse, for sure.

Kit: Yeah. There is some debate about whether or not this is actually a structure, um,

and what exactly it is and what's causing these gamma ray bursts. There seems to be some ongoing debate, but a, ah, 2020 study did support the idea that this is a Galaxy filament. But, um, there is a Space Telescope called the transient high energy sky and early universe surveyor that's slated to, uh, launch, aka Theseus, um, which

Jordan: what an acronymn Transient high energy sky in early universe surveyor, aka Theseus

Kit: Theseus. Um, and this project could give a lot more information about what exactly, um, this structure is.

Jordan: Yeah, we need to know more.

Kit: Yeah, there was a lot of stuff I did not understand about this thing. Um, I watched a really nice and approachable video with history and more scientific background and theories. So I'll be sure to post that our show notes and on our socials. Um, I just explained what I could understand.

Jordan: Brilliant. Well, all right, move over, M 13 and everyone else, and let's welcome the great wall to our Gold star of the Month club.

Outro

Thank you for joining us today as we explored the cosmic background of the constellation Hercules. Next week, we'll be retelling and retconstellationing the myths of this constellation.

Kit: This has been Kit

Jordan: And Jordan,

Kit: Sisters. Lovers of stars and stories.

Jordan: And we'll see you next time

Kit: On Starry Time. [music.

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