Podcast**:** Imagine This

Episode Title: How does the sun light up the whole world?

Duration: 11’ 37”

[ABC Kids podcast sting – This is an ABC podcast]

*[Classical music starts]*

**Nij:** Hello, I’m Nij and today on Imagine This… talking about the sun!

**Kid 1:** The sun makes me feel happy

**Kid 2:** Hot and warm and cosy. Makes me feel really good

**Kid 1:** And makes the day feel nice

**Nij:** Totally, Mabel has a question about the sun…

**Kid 2**: How does the sun light up the whole world?

**Nij:** Hm what do you think?

**Kid 2:** Um because it’s big, it’s really, really big

**Kid 1:** Because it’s really hot fire on it

**Kid 2:** I think its hotter than fire

**Kid 1:** Or lava I think

**Nij:** Who should we talk to about the sun?

**Kid 2:** I think we could talk to a scientist

**Kid 1:** A person who knows a lot about the sun

**Nij:** Yeah, I reckon we should talk to Professor Lisa Harvey-Smith – she’s an astrophysicist

**Kid 1:** Astrophysicist?

**Nij:** Astrophysics is a type of astronomy – the science of stars!

**Kid 2:** The sun is a very big star?

**Nij:** Yeah! C’mon, I bet we can find Lisa at the observatory!

*[Music ends as we enter the observatory. The room is large and open and footsteps and voices echo around]*

**Kid 1:** Hello?

**Kid 2:** Oh, it’s all dark

**Nij:** Hello? Lisa!?

**Lisa:** *(voice echoing)* Oh hello!

**Kid 1:** I can’t see

**Kid 2:** Who turned out the lights?!

**Lisa:** *(laughing)* I did, the only way to see stars is in the dark. Hang on a minute. Let me open the roof up

*[Buttons click, mechanical sound of roof opening. We can hear night-time sounds – crickets chirping and owls hooting]*

**Nij:** Wow! There are so many stars!

**Kid 1:** I can see a billion tra-zillion billion stars

**Kid 2:** They look so shiny

**Kid 1:** Wow

**Lisa:** Aren’t they spectacular?

**Kid 2:** I can see blue stars

**Kid 1:** They make cool shapes

**Nij:** Lisa, can you help us with our question, we want to know how the sun lights up the whole world

**Kid 2:** Well, it can’t light up the whole world. It lights up, I think, half of a world

**Lisa:** (laughing) Yes, the sun only lights up half the world at a time. So, whenever it’s dark outside, the sun is lighting up the other side of Earth

**Nij:** And if its daytime, it’ll be night-time somewhere else

**Lisa:** That’s right. If you want to learn more about the sun – the stars are a great place to start. That’s because the sun is our closest star

*[Sprightly classical music starts]*

**Kid 1:** I never knew that… Wow

**Kid 2:** The starts look like specks, and the sun looks like a circle

**Kid 1:** Well, the difference is the suns bigger, and the stars are far-er and smaller

**Nij:** There are so many tiny twinkling stars in the sky at night and then there’s just one sun in the day. How come?

**Lisa:** The only reason for that is distance. The sun is much, much, much closer to us than any other star.

**Kid 2:** How close is it?

**Lisa:** Oh, only about 150 million kms away.

**Kid 1:** 150 million!?

**Lisa:** If you drove really fast in a car, it’d take you about 180 years to get there

**Nij:** That’s not close

**Kid 2:** That’s ages!

**Lisa:** *(laughing)* Yeah

**Nij:** So, stars only *look* small at night because they’re far away

**Lisa:** Yeah. But up close, all stars are enormous

**Kid 1:** Bigger than Earth?

**Lisa:** Our sun is so big, you could fit more than one million Earths inside

**Kid 2:** Wow!

**Kid 1:** Huge! Actually, bigger than huge, giant, really, really, really, *really* big

**Lisa:** Let’s use our imaginations to take a closer look at the sun. We can see exactly how a star makes all that light

**Kid 2:** We need a rocket ship

**Kid 1:** And space suits

**Kid 2:** We need sunscreen

**Kid 1:** And one thousand and twenty-five eight waters

**Lisa:** *(laughing)* You better imagine the world’s best air conditioning too. It’s about to get really, really hot

*[Launch sequence begins]*

**Nij:** Alright ready for the countdown

**Lisa, Nij and the kids**: 10, 9, 8, 7, 6, 5, 4, 3, 2, 1! Blast off!!

**Nij:** We’re going up! Woah its bumpy

**Kid 1:** We’re through the clouds

**Lisa:** And out of Earth’s atmosphere!

**Nij:** Alright I’m punching in the coordinates

*[Beeps on spaceship computer]*

Destination - the sun! Oop, hang a right!

*[Whooosh]*

**Kid 2:** I can see earth now

**Kid 1:** The sky looks like dark black

**Kid 2:** I can see stars, planets

**Nij:** Look there goes Venus!

**Lisa:** And here comes Mercury

**Nij:** Wow it’s getting so bright. Everyone put your sunnies on

**Kid 1:** When you’re close to the sun it’s sunny

**Lisa:** Yes, the closer we get to the sun, the brighter and hotter it’s going to get too

*[Whooshy wind sounds]*

**Nij:** What’s that sound?!

**Lisa:** The solar wind! The sun is beaming out lots of light, and heat and it’s shooting out cosmic rays too!

*[Distorted crackles]*

**Nij:** Cosmic rays?!

**Lisa:** Time to put the shields up

*[Forcefield beeps on]*

**Lisa:** Look out, here come the subatomic particles!

**Nij:** Wow it’s getting hot in here!

**Kid 2:** Maybe cos it’s so bright and usually bright things get hotter and hotter

**Lisa:** The sun *is* burning but not in the same way as a fire burns wood, or gas burns on the stove. A star makes light and heat through something called nuclear fusion.

*[Gentle classical music starts]*

**Kid 1:** What does that do?

**Lisa:** Fusion is a word we use when two small things mush together to make one bigger thing. Nuclear fusion means that teeny tiny particles that make up atoms are sticking together

**Kid 2:** I don’t really know what atoms are

**Kid 1:** Everything is made out of atoms

**Kid 2:** They’re small

**Nij:** Yeah, like you need a really special microscope to see them

**Lisa:** Inside a star, lots of things are flying around at top speed! Hot swirling gases called helium and hydrogen are churning around with a lot of energy. Two hydrogen atoms can crash into each other with so much force, they stick together. When this happens, they create helium

**Kid 1:** What does that do?

**Lisa:** It creates light and heat! Like a little explosion

**Kid 2:** Cool

**Nij:** How many explosions are happening in there?

**Lisa:** 100 million quadrillion quadrillion explosions every second

**Kid 1:** What?

**Kid 2:** Wow

**Nij:** That’s why it’s so hot

**Lisa:** C’mon, let’s fly up for a closer look at the surface

*[Sound of bubbling and sizzling surface of the Sun]*

**Kid 1:** It looks like lava!

**Nij:** Ooh it’s bubbling?

**Kid 2:** Like orange porridge!

**Nij:** It’s so swirly and churny there

**Lisa:** The surface of the sun is a very busy place

**Nij:** Can we walk on it?

**Kid 1:** No, it’s too hot!

**Kid 2:** Very hot and burny

**Lisa:** It *is* too hot. Thousands of degrees too hot. But you actually can’t walk on it because there’s no ground to walk on.

**Nij:** So, if it’s all just super-hot gas, what’s keeping it all together?

*[Atmospheric classical music]*

**Lisa:** Gravity! It’s squeezing the sun and all its hot gases into a ball. It looks like it’s solid the way Earth is, but actually it’s all just gas held together very tightly

**Nij:** If the sun is so bright, how come space is so dark?

**Lisa:** Well, light can travel a long way. Like the light from the sun beaming down on Earth. Or the light from distant stars, twinkling in the sky. But light needs to hit something to for us to see it.

**Kid 1:** What do you mean?

**Lisa:** It’s like if you shine a torch outside at night.

**Kid 2:** You shine it so you can see things in the dark

**Lisa:** Yeah, when you shine the light on a tree, you can see it because the light is bouncing off the tree. Or the light can bounce off the ground in front of you, so you can see where you’re going. But if you shine a torch up at the night sky

**Kid 1:** Then the torch light disappears!

**Lisa:** Yeah, light needs to reflect off things for us to see it

**Nij:** Ahh so because space is mostly empty, it looks black but once the light from the sun hits something… like a planet or the moon

**Nij:** We can see them!

**Lisa:** That’s right

**Nij:** Ah Lisa, I think I’m starting to get sunburnt!

**Lisa:** Ooh yikes, time to head home

*[Zooming sound]*

**Kid 2:** Look it’s Earth!

**Nij:** Yeah, half of its really bright

**Kid 1:** And that’s daytime

**Nij:** And half of it’s in shadow. Oh look, there’s Australia in the shadowy bit

**Lisa:** Yes, it’s night-time! You can even see all the streetlights on!

**Nij:** Goodnight, everyone!

**Kid 2:** Goodnight!

**Nij:** We’ll be quiet when we land

**Kid 1:** *(whispers)* We’ll be quiet

*[Spaceship lands loudly with lots of bumps and the sounds of heaped metal. The door opens and we can hear the night-time crickets and owls]*

**Nij:** Look at all the stars! It’s so cool that each one is as big as our sun!

**Lisa:** Isn’t it amazing? And these are just the ones we can see with our eyes, there are countless more in the universe.

**Nij:** That’s a lot of light!

**Lisa:** Yeah, they’re all too far away to light up our world. So we’re very lucky we have our big, beautiful sun to keep us warm

**Nij:** Thanks so much for teaching us all about the stars

**Kid 2:** And our star

**Kid 1:** the sun!

**Lisa:** No worries! I’ll take any chance to go to space – I love it

*[Classical music starts]*

**Nij:** So, Mabel, the sun lights up the world because it is our closest star

a giant ball of hot swirling gas held together by gravity

**Kid 1:** Squeezed tight

**Nij:** Inside the star, atoms are whizzing around at top speed

And tiny parts of these atoms are sticking together with so much force

they create light and heat

**Kid 2:** Nuclear fusion

**Nij:** The light travels all the way through space to us here

On the half of the world that’s facing the sun

**Kid 1:** It’s daytime!

**Nij:** While the other half, is in a shadow

**Kid 2:** It’s night-time

**Kid 1:** and we can see stars

**Nij:** There are *countless* of stars in the universe. And all of them are hot bright suns. And maybe they’re lighting up their own worlds far, far away…

*[Classical music ends]*

Imagine This is an ABC Kids listen podcast. Hosted by me Dr Niraj Lal. A big thanks to Professor Lisa Harvey-Smith from the University of NSW and all the kids on the show. Today’s episode was recorded on the Gadigal, Wurundjeri, palawa, Dharug, Wardandi Nations. Written and produced by Soumia Bella with sound design by Que Ngyuen; senior producer is Emma Gibbs. For more great podcasts to play, music to move, and stories and soundtracks for sleep. Download the ABC Kids listen app. Free from your app store.