

CHRIS HADFIELD

**SPACE
LULLABY**

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00:00:13,260 --> 00:00:21,270

He performed in space, entertaining millions back on Earth.

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00:00:21,270 --> 00:00:25,260

Ground control to major Tom.

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00:00:25,260 --> 00:00:31,860

Now, talented astronaut Chris Hadfield returns to the Rocket Ranch.

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00:00:31,860 --> 00:00:33,620

It's one of my favorite places on Earth.

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00:00:33,620 --> 00:00:36,490

But he wants us to go back to the moon.

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00:00:36,490 --> 00:00:42,480

We are at the moment in history right now where our technology is good enough that we

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00:00:42,480 --> 00:00:45,140

can start to settle the moon.

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00:00:45,140 --> 00:00:46,409

And we're going to Mars.

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00:00:46,409 --> 00:00:49,840

But Chris cares about why we want to go.

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00:00:49,840 --> 00:00:57,729

If it's just as a stunt, if it's just to show that we can, then it's a race, and when the

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00:00:57,729 --> 00:01:02,370

tape breaks across the first person's chest to do it, the race is over.

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00:01:02,370 --> 00:01:04,680
Why would you ever go again?

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00:01:04,680 --> 00:01:08,900
Chris Hadfield is talking and performing.

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00:01:08,900 --> 00:01:15,330
And I will love you now and always to the stars above.

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00:01:15,330 --> 00:01:17,430
Next, on the Rocket Ranch.

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00:01:17,430 --> 00:01:21,684
EGS program chief engineer verifying no constraints to launch.

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00:01:21,684 --> 00:01:24,634
Three, two, one, and lift off.

18
00:01:24,634 --> 00:01:27,538
Welcome to space.

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00:01:30,040 --> 00:01:34,690
Astronaut Chris Hadfield flew to space three times, and was the first Canadian to walk

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00:01:34,690 --> 00:01:35,880
in space.

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00:01:35,880 --> 00:01:40,740
His cover of David Bowie's Space Oddity that he recorded on the International Space Station

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00:01:40,740 --> 00:01:46,420
has over 47 million views, and as you're about to hear, he's given a lot of thought to the

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00:01:46,420 --> 00:01:50,840

future of space exploration, and what it can mean for all of us.

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00:01:50,840 --> 00:01:54,280

We begin with his impressive resume.

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00:01:54,280 --> 00:01:57,880

Chris Hadfield, a retired Canadian astronaut, engineer.

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00:01:57,880 --> 00:02:02,320

You were a fighter pilot with the Royal Canadian Air Force.

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00:02:02,320 --> 00:02:07,700

You're also the first Canadian to make a spacewalk, and you flew on two space shuttle missions,

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00:02:07,700 --> 00:02:11,200

and you were the commander of the International Space Station.

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00:02:11,200 --> 00:02:12,200

Chris Hadfield.

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00:02:12,200 --> 00:02:13,800

Thank you so much for taking the time to join us today.

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00:02:13,800 --> 00:02:14,800

My pleasure.

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00:02:14,800 --> 00:02:17,600

I was also a test pilot with the US Air Force and the US Navy.

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00:02:17,600 --> 00:02:18,760

Oh, very good.

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00:02:18,760 --> 00:02:20,510

And that helps a lot.

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00:02:20,510 --> 00:02:21,930

It does.

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00:02:21,930 --> 00:02:22,930

Yeah.

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00:02:22,930 --> 00:02:29,959

Every space flight is immensely dangerous, and still testing all of the equipment, and

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00:02:29,959 --> 00:02:34,260

my first space shuttle flight, the risk was very high.

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00:02:34,260 --> 00:02:37,010

Even by the time I flew the third time, of course, risks were still high.

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00:02:37,010 --> 00:02:39,749

So yeah, it's good to have people with an operational background.

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00:02:39,749 --> 00:02:43,779

So as you say, engineer and fighter pilot, but also test piloting.

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00:02:43,779 --> 00:02:46,549

You just arrived here at the Kennedy Space Center.

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00:02:46,549 --> 00:02:52,250

What's it like for you, as you came back here to the rocket ranch, the place where, I didn't

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00:02:52,250 --> 00:02:57,239

want to use a pun, but really the space portion of your career took off?

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00:02:57,239 --> 00:02:58,239

Yeah.

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00:02:58,239 --> 00:03:00,680

This is one of the real special places on Earth.

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00:03:00,680 --> 00:03:03,140

It's a spaceport.

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00:03:03,140 --> 00:03:09,189

A seaport, or there didn't used to be airports, airports are kind of a new invention.

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00:03:09,189 --> 00:03:11,370

It's only really a hundred years old.

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00:03:11,370 --> 00:03:13,280

But spaceport is even newer than that.

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00:03:13,280 --> 00:03:17,180

This is one of the places where we leave Earth and come back again.

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00:03:17,180 --> 00:03:18,270

And that's new.

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00:03:18,270 --> 00:03:22,230

So to me there's a great aura about it as well.

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00:03:22,230 --> 00:03:26,779

And plus, I left Earth twice here, and I worked here for a lot of years.

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00:03:26,779 --> 00:03:28,760

So it's one of my favorite places on Earth.

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00:03:28,760 --> 00:03:30,950

So I'm really pleased to be here with you today.

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00:03:30,950 --> 00:03:32,049

We're glad to have you.

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00:03:32,049 --> 00:03:37,859

Chris, what are your thoughts about the commercialization of space, particularly near Earth orbit?

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00:03:37,859 --> 00:03:40,200

Well, space has always been commercial.

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00:03:40,200 --> 00:03:45,450

There's sort of a weird misnomer that ... People forget the shuttle was built by a commercial

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00:03:45,450 --> 00:03:49,129

company, Rockwell, and the lunar Lander that Neil Armstrong and Buzz Aldrin stepped out

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00:03:49,129 --> 00:03:51,819

of was built by Grumman.

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00:03:51,819 --> 00:03:58,459

It's not like NASA is an aerospace builder, to a large degree.

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00:03:58,459 --> 00:04:00,280

So that hasn't changed as much as we think.

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00:04:00,280 --> 00:04:06,139

We were fascinated by it, but Northrup and Grumman and Boeing and Hughes, those were

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00:04:06,139 --> 00:04:13,069

all people, just like now, with Bezos and Musk, they're just brilliant, hardworking

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00:04:13,069 --> 00:04:19,440
engineers with an incredible work ethic and
a really bizarre vision that allows us to

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00:04:19,440 --> 00:04:21,269
do stuff we could never do before.

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00:04:21,269 --> 00:04:23,900
So I think it's a pretty exciting time.

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00:04:23,900 --> 00:04:29,700
It's a continuation of a lot of exciting times
in the past, but too, I've had a break in

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00:04:29,700 --> 00:04:34,290
between our ability to launch people from
the United States, just like we did after

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00:04:34,290 --> 00:04:39,450
Mercury and Gemini, and after Apollo, we've
had a long break after the shuttle.

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00:04:39,450 --> 00:04:43,791
And I'm really looking forward to these new
vehicles, the one built by Boeing and the

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00:04:43,791 --> 00:04:45,370
one built by space X.

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00:04:45,370 --> 00:04:47,730
They're really advanced compared to the shuttle.

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00:04:47,730 --> 00:04:51,510
The shuttle was such a primitive beast to
fly.

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00:04:51,510 --> 00:04:58,230
And the evolution has pushed them into a shape

that is quite different.

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00:04:58,230 --> 00:05:02,670
I think we're finally learning what spaceships should actually look like.

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00:05:02,670 --> 00:05:07,530
If you look back a hundred years ago at flight, airplanes looked like all kinds of weird things.

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00:05:07,530 --> 00:05:10,760
Three wings, two wings, a tail in front, tail in the back.

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00:05:10,760 --> 00:05:15,020
We were just trying to figure out, how should airplanes look?

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00:05:15,020 --> 00:05:18,900
Now it's pretty well decided, what's the most efficient design.

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00:05:18,900 --> 00:05:23,640
And that's where we're getting now with spaceships as well, especially ones that leave and return

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00:05:23,640 --> 00:05:24,640
to Earth.

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00:05:24,640 --> 00:05:28,790
This will allow, of course, NASA to focus more on deep space exploration.

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00:05:28,790 --> 00:05:33,730
Do you think that there is a ... There's a lot of debate about this, a commercial market

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00:05:33,730 --> 00:05:36,440
out on the moon?

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00:05:36,440 --> 00:05:41,810
Do you foresee that, as an astronaut that
has spent a lot of time in space, and thinking

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00:05:41,810 --> 00:05:42,810
about these things?

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00:05:42,810 --> 00:05:49,190
So I'm the chair of the board of a space company,
a foundation called Open Lunar, and Open Lunar's

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00:05:49,190 --> 00:05:55,450
whole reason to exist is the fact that we
are at the moment in history right now where

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00:05:55,450 --> 00:05:59,240
our technology is good enough that we can
start to settle the moon.

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00:05:59,240 --> 00:06:02,010
And it sounds crazy, right?

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00:06:02,010 --> 00:06:04,160
It sounds like, that's nuts, and why would
anybody go to the moon?

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00:06:04,160 --> 00:06:11,510
We forget the very first person to stand at
the South pole was in 1911, and yet now thousands

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00:06:11,510 --> 00:06:16,230
of people live and work and go to the Antarctic
every year, and nearly a hundred live at the

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00:06:16,230 --> 00:06:22,120
South pole year round, where they just about
died 110 years ago.

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00:06:22,120 --> 00:06:24,280

It's because our technology got better.

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00:06:24,280 --> 00:06:27,990
Transportation, how we generate power, that
type of thing.

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00:06:27,990 --> 00:06:32,060
Spaceflight was impossible when I was a kid,
no one had ever flown in space when I was

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00:06:32,060 --> 00:06:33,060
born.

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00:06:33,060 --> 00:06:38,520
Now we've had people living on the space station
for almost 20 years, and we've discovered

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00:06:38,520 --> 00:06:43,470
water on the moon, and we know that the North
and South pole both have eternal solar power.

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00:06:43,470 --> 00:06:49,180
So if you've got power and water, then how's
it any different than being anywhere else?

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00:06:49,180 --> 00:06:51,750
It's just a matter of whether your habitat
is good enough.

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00:06:51,750 --> 00:06:54,440
So I think it's a pretty exciting time.

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00:06:54,440 --> 00:07:00,410
And as we start to settle the moon, just like
anywhere, there will be lots of things that

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00:07:00,410 --> 00:07:04,040
make a profit and lots of things that don't.

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00:07:04,040 --> 00:07:10,240

And part of it's going to be born by governments, putting the federal road system across, or

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00:07:10,240 --> 00:07:15,130

the rail system, or all the power, a lot of the infrastructure that needs to be built.

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00:07:15,130 --> 00:07:18,480

That's the role of large entities.

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00:07:18,480 --> 00:07:24,330

But there's always, just like building a space shuttle or building a Boeing vehicle, or a

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00:07:24,330 --> 00:07:27,140

SpaceX vehicle, there's private entities involved.

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00:07:27,140 --> 00:07:32,730

I also run a technology incubator under the Creative Destruction Lab, that I run the whole

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00:07:32,730 --> 00:07:34,490

space stream for that.

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00:07:34,490 --> 00:07:38,240

And we have hundreds of space businesses come to us every year.

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00:07:38,240 --> 00:07:40,360

We whittle them down ... Or space ideas.

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00:07:40,360 --> 00:07:46,720

We whittle them down to potential businesses, and then help them through the whole process,

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00:07:46,720 --> 00:07:52,200

and try and turn them into an exponentially capable space company.

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00:07:52,200 --> 00:08:00,110

And so, yeah, it's a fascinating time in both space exploration, but also including not

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00:08:00,110 --> 00:08:03,639

just Earth orbit, but the moon, in an Earth, moon economic system.

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00:08:03,639 --> 00:08:05,700

It's a pretty interesting moment.

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00:08:05,700 --> 00:08:12,500

And NASA sees this lunar mission as a way to get to Mars.

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00:08:12,500 --> 00:08:18,540

Of course, Mars excites us, because it's another planet, and it takes so long to get there,

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00:08:18,540 --> 00:08:22,220

but it fires the imagination for a lot of folks.

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00:08:22,220 --> 00:08:24,450

NASA has said, "We're going."

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00:08:24,450 --> 00:08:29,690

What do you think about a mission to Mars, and how feasible it is?

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00:08:29,690 --> 00:08:31,090

All the technology that we need?

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00:08:31,090 --> 00:08:34,339

Sure, well of course we've had dozens and dozens of missions to Mars already, just all

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00:08:34,339 --> 00:08:35,950

robotic.

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00:08:35,950 --> 00:08:40,450

And a lot of them failed, because it is a long ways away, and there are so many myriad

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00:08:40,450 --> 00:08:47,720

problems to solve that someone actually has to figure out and deal with the unknown.

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00:08:47,720 --> 00:08:49,880

And eventually, of course, we'll have people on Mars.

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00:08:49,880 --> 00:08:56,170

Just, you don't have to go very far back in history to just change your line of impossible.

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00:08:56,170 --> 00:09:00,980

It was impossible to sail the Atlantic for a long time, for hundreds of thousands of

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00:09:00,980 --> 00:09:01,980

years.

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00:09:01,980 --> 00:09:02,980

And then we figured out how.

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00:09:02,980 --> 00:09:05,160

Now you cross the Atlantic and all you're worried about is whether you've seen these

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00:09:05,160 --> 00:09:10,410

movies before or not, we've made it so easy.

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00:09:10,410 --> 00:09:15,290

So is the technology good enough now that we can start thinking about not just sending

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00:09:15,290 --> 00:09:19,170

robots and risking robots to Mars, but sending people?

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00:09:19,170 --> 00:09:21,600

I don't think our technology is quite there yet.

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00:09:21,600 --> 00:09:23,180

Our engines are very primitive.

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00:09:23,180 --> 00:09:26,310

It's almost like trying to row to Australia, right now.

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00:09:26,310 --> 00:09:27,570

You could maybe do it.

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00:09:27,570 --> 00:09:32,590

There are people that row the Atlantic, but it's hard and dangerous, and not particularly

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00:09:32,590 --> 00:09:36,200

elegant, and not the long-term solution.

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00:09:36,200 --> 00:09:39,340

So I think the way we're going about it makes a lot of sense.

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00:09:39,340 --> 00:09:44,131

Sort out the technology, build a space station, have people live there for a generation, learn

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00:09:44,131 --> 00:09:47,020

how we support something that's close to Earth.

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00:09:47,020 --> 00:09:48,780

Then do the same thing on the moon.

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00:09:48,780 --> 00:09:53,380

Three days away, we're going to have to push a lot of technologies to allow people to thrive

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00:09:53,380 --> 00:09:56,540

orbiting the moon, and on the surface of the moon.

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00:09:56,540 --> 00:10:00,680

But once we figured that out, then see if that's the moment where now, hey, you know

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00:10:00,680 --> 00:10:01,680

what?

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00:10:01,680 --> 00:10:06,270

We can put all this stuff together and have a safe and worthwhile plan to go to Mars.

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00:10:06,270 --> 00:10:08,940

But you also have to answer the question, why?

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00:10:08,940 --> 00:10:09,940

That's the great question.

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00:10:09,940 --> 00:10:10,940

What's the purpose?

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00:10:10,940 --> 00:10:11,940

Why would we go to Mars?

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00:10:11,940 --> 00:10:19,000

If it's just as a stunt, if it's just to show that we can, then it's a race.

162

00:10:19,000 --> 00:10:24,130

And when the tape breaks across the first person's chest to do it, the race is over.

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00:10:24,130 --> 00:10:25,840

And why would you ever go again?

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00:10:25,840 --> 00:10:27,510

You've already shown that you can.

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00:10:27,510 --> 00:10:29,650

And that's sort of what happened in the Apollo program.

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00:10:29,650 --> 00:10:32,550

It was a proxy for the Cold War.

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00:10:32,550 --> 00:10:37,260

Kennedy was coming out of the Bay of Pigs problems, and trying to be a very effective

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00:10:37,260 --> 00:10:40,820

and far thinking president, and had all sorts of opposition.

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00:10:40,820 --> 00:10:47,940

But it was a race, and the United States won, but it led to a great crash of space flight

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00:10:47,940 --> 00:10:52,200

afterwards for a long time, because it was a race that ended.

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00:10:52,200 --> 00:10:59,610

And I think people confuse exploration and entertainment, sometimes.

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00:10:59,610 --> 00:11:05,280

And sometimes they overlap, but the purpose of exploration is not just entertainment.

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00:11:05,280 --> 00:11:10,260

It's trying to scientifically understand the rest of the universe and how everything works,

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00:11:10,260 --> 00:11:14,700

what dark matter is, and where did life come from, and what is the future of the planet

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00:11:14,700 --> 00:11:17,520

Earth, and can we learn from other planetary systems?

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00:11:17,520 --> 00:11:21,930

So that will always be one of the drivers.

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00:11:21,930 --> 00:11:27,470

Going to Mars just as an entertainment event, I think is self-defeating and doomed.

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00:11:27,470 --> 00:11:33,710

So I think the logical progression of what we're doing is actually what's going to prevail.

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00:11:33,710 --> 00:11:37,040

We're going to continue to live on space station for the decade or so.

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00:11:37,040 --> 00:11:42,250

We are going to set up a temporary and then permanent habitation on the moon, where the

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00:11:42,250 --> 00:11:49,790

moon just becomes another place that people live, just like, I don't know, Maine, or Alaska,

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00:11:49,790 --> 00:11:55,220

or Antarctica, or the 11 million people a day that are onboard an airliner, in an extremely

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00:11:55,220 --> 00:11:56,880

hostile environment.

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00:11:56,880 --> 00:12:00,160

It'll just be a place, so long as the moon becomes self-sufficient, you can go there

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00:12:00,160 --> 00:12:01,160

like anywhere.

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00:12:01,160 --> 00:12:02,620

Would you live on the moon?

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00:12:02,620 --> 00:12:03,620

Sure.

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00:12:03,620 --> 00:12:04,620

I'd love to live on the moon.

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00:12:04,620 --> 00:12:05,620

Why not?

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00:12:05,620 --> 00:12:07,180

Some people say Earth just is the most incredibly beautiful place.

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00:12:07,180 --> 00:12:11,040

Well, some people say that their hometown is the most incredible place, or their house,

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00:12:11,040 --> 00:12:12,399

or their living room, or their backyard.

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00:12:12,399 --> 00:12:15,540

And for them, that's right, and that's fine.

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00:12:15,540 --> 00:12:17,310

But it's not the only place.

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00:12:17,310 --> 00:12:24,220

And life is kind of what you make of it, given the environment that you're in.

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00:12:24,220 --> 00:12:28,120

I've lived in many places around the world,
and been around the world 2,600 times.

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00:12:28,120 --> 00:12:32,560

I would love the opportunity to be part of
the team that is settling the moon, try and

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00:12:32,560 --> 00:12:36,399

make that part of the human experience.

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00:12:36,399 --> 00:12:39,810

We know virtually nothing of what's under
the surface of the moon.

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00:12:39,810 --> 00:12:41,710

It's all sort of hypothesis.

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00:12:41,710 --> 00:12:47,110

We have no idea what mineral resources there
are on the moon.

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00:12:47,110 --> 00:12:50,630

It's just that it's larger than Africa, from
a surface area.

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00:12:50,630 --> 00:12:54,510

And we know nothing about it, except we've
looked from a distance.

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00:12:54,510 --> 00:12:59,120

Imagine if we just discovered a whole continent
bigger than Africa, that nobody was living

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00:12:59,120 --> 00:13:02,050

on, and what are we going to do next?

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00:13:02,050 --> 00:13:04,010

That's where we are with the moon.

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00:13:04,010 --> 00:13:10,160

And the fact that our technology now allows us to not just briefly visit like the Apollo

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00:13:10,160 --> 00:13:14,300

astronauts who bravely did, but actually start living there, to me it's a great moment.

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00:13:14,300 --> 00:13:18,080

And a lot of people are fascinated with Mars as well, and we'll get there eventually.

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00:13:18,080 --> 00:13:23,830

But there's a bunch of stepping stones between here and there, before we go to Mars.

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00:13:23,830 --> 00:13:27,480

And to me, that's where the real interest is, in each one of those stepping stones.

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00:13:27,480 --> 00:13:31,190

Do you think there's some life on Mars?

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00:13:31,190 --> 00:13:35,270

Ancient, microbial life, that we might discover?

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00:13:35,270 --> 00:13:38,990

I work a little bit with the Breakthrough Initiative, which is looking to try and find

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00:13:38,990 --> 00:13:41,920

life somewhere besides Earth.

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00:13:41,920 --> 00:13:46,450

I think that's a really fascinating question.

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00:13:46,450 --> 00:13:48,150

We don't know the answer to it.

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00:13:48,150 --> 00:13:51,149

People imagine that they see little green aliens all the time.

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00:13:51,149 --> 00:13:56,370

You see something in the sky you don't understand, and people, "Oh, it's a UFO", and that's fun

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00:13:56,370 --> 00:13:57,370

and entertaining.

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00:13:57,370 --> 00:14:03,180

But the reality is, we have never seen life anywhere except Earth.

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00:14:03,180 --> 00:14:08,110

But we're looking, and our big telescopes have seen thousands and thousands of planets

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00:14:08,110 --> 00:14:12,740

around other stars, so much so that now we know how many planets there are in the universe,

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00:14:12,740 --> 00:14:15,220

roughly, to an order of magnitude.

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00:14:15,220 --> 00:14:18,990

And it's one and 28 zeros.

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00:14:18,990 --> 00:14:25,900

The number is so unbelievably huge, of the number of planets that exist, that it would

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00:14:25,900 --> 00:14:30,459

be really surprising if life only existed on Earth.

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00:14:30,459 --> 00:14:34,440

It would make no sense at all, statistically, especially since we know that life has been

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00:14:34,440 --> 00:14:38,840

on Earth continuously for four billion years.

230

00:14:38,840 --> 00:14:46,910

Not advanced life, not complicated life, not thinking sentient life, but ... So I'm personally

231

00:14:46,910 --> 00:14:51,709

confident that when our sensors and detectors get good enough, we will find life somewhere

232

00:14:51,709 --> 00:14:52,709

besides Earth.

233

00:14:52,709 --> 00:14:58,170

But until we find it, no one knows, but will we find it in our own solar system, on Mars?

234

00:14:58,170 --> 00:14:59,170

Maybe.

235

00:14:59,170 --> 00:15:03,920

Mars was a lot like Earth four billion years ago, when life developed on Earth.

236

00:15:03,920 --> 00:15:07,250

So why would we think it wouldn't develop on Mars?

237

00:15:07,250 --> 00:15:09,589

Mars has had a very different history since then.

238

00:15:09,589 --> 00:15:14,779

We have found moons of other planets that have more water than Earth, more water than

239

00:15:14,779 --> 00:15:16,230

Earth around a moon.

240

00:15:16,230 --> 00:15:18,040

And that has heat, liquid water.

241

00:15:18,040 --> 00:15:23,600

And if you've got billions of years of liquid water, then perhaps life has developed, in

242

00:15:23,600 --> 00:15:29,160

a very green, slimy form in moons of Jupiter or Saturn.

243

00:15:29,160 --> 00:15:30,810

That's possible.

244

00:15:30,810 --> 00:15:35,860

So I think we're going to find life somewhere else, but we have to go look.

245

00:15:35,860 --> 00:15:39,860

And that's the very essence of one of the great pillars of exploration.

246

00:15:39,860 --> 00:15:44,410

And the big question that surrounds it, what happened to it, if it was there, if it existed

247

00:15:44,410 --> 00:15:46,100

four billion years ago?

248

00:15:46,100 --> 00:15:54,660

Chris, you of course became one of the few highly popular celebrity astronauts after

249

00:15:54,660 --> 00:15:55,890

you went into space.

250

00:15:55,890 --> 00:16:01,110

And I believe most of it came from your music that you played.

251

00:16:01,110 --> 00:16:02,290

Yeah.

252

00:16:02,290 --> 00:16:07,980

People forget, my first space flight, it was on the cover of Time magazine back in the

253

00:16:07,980 --> 00:16:11,290

'90s, but you're right.

254

00:16:11,290 --> 00:16:14,130

People don't really understand space flight.

255

00:16:14,130 --> 00:16:16,200

I'm fascinated by it, have been since I was a kid.

256

00:16:16,200 --> 00:16:19,980

But for a lot of people, it's just another thing in the news, and interesting.

257

00:16:19,980 --> 00:16:27,279

And so, yeah, if you were commanding a spaceship, apart from doing all the work, how would you

258

00:16:27,279 --> 00:16:29,450

share the experience with people?

259

00:16:29,450 --> 00:16:31,140

I'd tell everybody I could.

260

00:16:31,140 --> 00:16:32,600

But how?

261

00:16:32,600 --> 00:16:36,490

When my first flight, there was no social media, and the internet was still in its infancy.

262

00:16:36,490 --> 00:16:41,399

So a very limited megaphone to talk through, or telephone wire.

263

00:16:41,399 --> 00:16:48,120

And by the time I flew in space the third time, we had not just Facebook, but Twitter,

264

00:16:48,120 --> 00:16:50,850

and a way to digitally record.

265

00:16:50,850 --> 00:16:52,240

On my first flight, it was all filmed.

266

00:16:52,240 --> 00:16:55,040

It's very hard to share a picture if it's just on film.

267

00:16:55,040 --> 00:16:59,269

To be able to digitally share information

...

268

00:16:59,269 --> 00:17:06,149

So in addition to commanding the space station and getting, we set records for the amount

269

00:17:06,149 --> 00:17:10,610

of science we got done, I also worked hard in my spare time up there to try and share

270

00:17:10,610 --> 00:17:12,510

the experience as best I could.

271

00:17:12,510 --> 00:17:13,510

And there's a guitar up there.

272

00:17:13,510 --> 00:17:15,899

There's lots of astronauts who are musicians.

273

00:17:15,899 --> 00:17:21,200

And so I wrote a whole album of music while I was on the space station, and I played with

274

00:17:21,200 --> 00:17:23,810

other bands on Earth.

275

00:17:23,810 --> 00:17:29,140

I played with the Chieftains, and did a thing with schools where 700,000 kids sang a song

276

00:17:29,140 --> 00:17:34,810

simultaneously with me, all around the world, on a program called Music Mondays.

277

00:17:34,810 --> 00:17:38,860

And I also did a cover of a Bowie tune that a lot of people have seen.

278

00:17:38,860 --> 00:17:45,030

So to me, it was part of who I am, and I'm a musician, but it was also a wonderful way

279

00:17:45,030 --> 00:17:49,460

to let people in on what it's actually like onboard a spaceship.

280

00:17:49,460 --> 00:17:52,570

This is part of life off the Earth.

281

00:17:52,570 --> 00:17:55,929

I really can't wait to hear the music from the moon.

282

00:17:55,929 --> 00:17:58,200

Think about bluegrass music...

283

00:17:58,200 --> 00:17:59,740

...What kind of inspiration?

284

00:17:59,740 --> 00:18:01,280

...Or New Orleans music.

285

00:18:01,280 --> 00:18:05,340

Would never have the jazz and the blues that we have, if all those influences from the

286

00:18:05,340 --> 00:18:10,429

world hadn't gone to a new place, and been sort of a melting pot of ideas, and created

287

00:18:10,429 --> 00:18:17,620

this own, what is now a whole new genre of music, or art, or human understanding.

288

00:18:17,620 --> 00:18:21,520

And it'll be interesting when they open the first little bar on the moon, and someone

289

00:18:21,520 --> 00:18:24,640

steps up to the mic and starts playing local music.

290

00:18:24,640 --> 00:18:25,820

That's going to happen pretty soon.

291

00:18:25,820 --> 00:18:28,920

Would love to imagine just what that would sound like, right?

292

00:18:28,920 --> 00:18:29,920

It's coming soon.

293

00:18:29,920 --> 00:18:30,920

It's going to be fun.

294

00:18:30,920 --> 00:18:34,179

In the meantime, there was a guitar up at the international space station.

295

00:18:34,179 --> 00:18:36,010

There is, it's a Larrivee made in Vancouver.

296

00:18:36,010 --> 00:18:37,010

Yeah.

297

00:18:37,010 --> 00:18:38,010

A nice one.

298

00:18:38,010 --> 00:18:39,010

Yeah.

299

00:18:39,010 --> 00:18:40,010

It's a nice little guitar.

300

00:18:40,010 --> 00:18:41,010

It's a little small, but it's good.

301

00:18:41,010 --> 00:18:42,010

There's a guitar here, Chris, that I mentioned-
Yeah.

302

00:18:42,010 --> 00:18:43,010

It's a Larrivee?

303

00:18:43,010 --> 00:18:45,300

Yeah, no, no, I don't think so.

304

00:18:45,300 --> 00:18:46,511

But it's a guitar, nonetheless.

305

00:18:46,511 --> 00:18:53,210

We would wonder if you, because you're still into music and you're playing, and you're

306

00:18:53,210 --> 00:18:54,210

touring.

307

00:18:54,210 --> 00:18:56,650

Yeah, I play, and I write, and record, and tour.

308

00:18:56,650 --> 00:18:59,550

And Bowie's band has asked me to tour and play with them.

309

00:18:59,550 --> 00:19:00,550

So I do.

310

00:19:00,550 --> 00:19:01,910

David Bowie's band, you were touring with?

311

00:19:03,910 --> 00:19:02,910

Yeah.

312

00:19:03,910 --> 00:19:07,120

They're great people, Earl Slick, and Mike and company.

313

00:19:07,120 --> 00:19:08,120

They're great.

314

00:19:08,120 --> 00:19:12,210

But yeah, I don't deserve to be in that band, but they humor me, and they let me come, and

315

00:19:12,210 --> 00:19:14,580

I've played in several cities with them, which is fun.

316

00:19:14,580 --> 00:19:19,350

But to me, music is just a wonderful way to celebrate.

317

00:19:19,350 --> 00:19:21,290

It's an intrinsic human way to celebrate life.

318

00:19:21,290 --> 00:19:27,170

And also, to help explain things that maybe you can't put into language any other way.

319

00:19:27,170 --> 00:19:33,590

So yeah, there's music on the space station, but there'll be music everywhere we ever go.

320

00:19:33,590 --> 00:19:34,590

That's fascinating.

321

00:19:34,590 --> 00:19:35,590

I play a little guitar.

322

00:19:35,590 --> 00:19:39,830

Is it different, as you get ready to play the guitar here in the studio, is it different

323

00:19:39,830 --> 00:19:43,000

playing the guitar in microgravity than it is here?

324

00:19:43,000 --> 00:19:44,000

Well, two big differences.

325

00:19:44,000 --> 00:19:47,220

If, for those of you who are watching this, the guitar of course has a little sculpted

326

00:19:47,220 --> 00:19:52,720

area where it sits on your knee, because the gravity pushes down on the guitar and then

327

00:19:52,720 --> 00:19:55,030
the guitar will stay in place.

328
00:19:55,030 --> 00:19:57,000
Without gravity, of course, that won't work.

329
00:19:57,000 --> 00:20:00,590
Or, if you're standing, you hang it with gravity,
with a strap.

330
00:20:00,590 --> 00:20:02,020
And that holds the guitar in front of you.

331
00:20:02,020 --> 00:20:03,400
So your hands are free.

332
00:20:03,400 --> 00:20:07,290
But if you're weightless, then the guitar
is floating.

333
00:20:07,290 --> 00:20:11,179
And every time you move your hand up and down
the fret board, the guitar just takes off,

334
00:20:11,179 --> 00:20:12,179
left and right.

335
00:20:12,179 --> 00:20:16,590
So if you watch the video of me playing various
things on the space station, you'll see I

336
00:20:16,590 --> 00:20:21,320
pinch it under my bicep, and that was to hold
it in place.

337
00:20:21,320 --> 00:20:26,030
It's weightless, but it still has mass, and
it still has inertia.

338

00:20:26,030 --> 00:20:32,750

But it's also a wonderful place to play, because you can float weightless next to one of the

339

00:20:32,750 --> 00:20:39,780

huge windows on the ship, and watch the world pour by silently beside you.

340

00:20:39,780 --> 00:20:42,110

Really inspirational and thoughtful place to be.

341

00:20:42,110 --> 00:20:45,670

And so, yeah, I wrote a variety of music up there.

342

00:20:45,670 --> 00:20:53,720

And the album, which is called Space Sessions, Songs from a Tin Can, even Bowie sent me a

343

00:20:53,720 --> 00:20:55,440

lovely note when I released it.

344

00:20:55,440 --> 00:20:57,559

And he really loved the version of Oddity that I did.

345

00:20:57,559 --> 00:20:59,700

So, because he always wanted to fly in space.

346

00:20:59,700 --> 00:21:02,690

So it's been a lovely come around, in amongst everything else.

347

00:21:02,690 --> 00:21:08,299

What song do you think would help us understand the nexus between music and space the best?

348

00:21:08,299 --> 00:21:10,049

Oh, there's all kinds.

349

00:21:10,049 --> 00:21:16,410

But part of it is, you can see the whole world,
you go around the world 16 times a day.

350

00:21:16,410 --> 00:21:20,590

So you see all seven and a half billion people
every day, but you're physically separate

351

00:21:20,590 --> 00:21:23,830

from them, people you don't know, and your
friends and your family.

352

00:21:23,830 --> 00:21:29,630

I wrote a song, because my kids have put up
with me playing music my whole life, and I

353

00:21:29,630 --> 00:21:31,160

sung them all lullabies as a kid.

354

00:21:31,160 --> 00:21:36,740

And so I wrote a thing for my daughter, who's
the youngest of my three children, as if I

355

00:21:36,740 --> 00:21:38,669

was singing her a lullaby.

356

00:21:38,669 --> 00:21:44,260

But this one was being sung across the thousands
of miles, from me onboard a spaceship, orbiting

357

00:21:44,260 --> 00:21:45,260

the world.

358

00:21:45,260 --> 00:21:46,260

It's called Space Lullaby.

359

00:21:46,260 --> 00:21:47,460

I'll do a little bit of that, if it's okay.

360

00:21:47,460 --> 00:22:00,550

We would love to hear it.

361

00:22:00,550 --> 00:22:06,660

Just picture me both sitting on the foot of
her bed, singing this song or floating weightless

362

00:22:06,660 --> 00:22:10,690

by the window, looking back across my lifetime
of memories of sitting on the foot of her

363

00:22:10,690 --> 00:22:11,690

bed.

364

00:22:11,690 --> 00:22:12,690

And this is Space Lullaby.

365

00:22:12,690 --> 00:22:16,309

(singing) Darkness falls.

366

00:22:16,309 --> 00:22:22,770

A favorite blanket that surrounds us all.

367

00:22:22,770 --> 00:22:26,270

A quiet ending to a busy day.

368

00:22:26,270 --> 00:22:33,210

Of noise and troubles we have put away to
sleep.

369

00:22:33,210 --> 00:22:35,630

You and I.

370

00:22:35,630 --> 00:22:41,230

You in your bedroom, me up in the sky.

371

00:22:41,230 --> 00:22:42,700

As close as dreaming.

372

00:22:42,700 --> 00:22:45,970

We are holding hands.

373

00:22:45,970 --> 00:22:51,799

You tuck so tightly as we lay now down to sleep.

374

00:22:51,799 --> 00:23:03,190

You say I've been away too long I'm only here and then I am gone.

375

00:23:03,190 --> 00:23:11,590

But I am coming home to tuck you in to bed.

376

00:23:11,590 --> 00:23:18,950

And I will love you now and always to the stars above.

377

00:23:18,950 --> 00:23:22,190

Rainbow of color swirling overhead.

378

00:23:22,190 --> 00:23:30,000

A favorite story that you read to fall asleep.

379

00:23:30,000 --> 00:23:31,919

To sleep.

380

00:23:31,919 --> 00:23:39,790

Lay now down to sleep.

381

00:23:39,790 --> 00:23:41,370

Wow.

382

00:23:41,370 --> 00:23:42,370

That was beautiful.

383

00:23:42,370 --> 00:23:43,370
Space Lullaby.

384
00:23:43,370 --> 00:23:44,370
Well done.

385
00:23:44,370 --> 00:23:45,370
I actually-
Nice guitar.

386
00:23:45,370 --> 00:23:46,370
Yeah.

387
00:23:46,370 --> 00:23:47,370
Oh, Well, thank You for that.

388
00:23:47,370 --> 00:23:48,370
Sounds nice.

389
00:23:48,370 --> 00:23:52,450
And beautiful song, that captures the emotions
that happen when you're so far away from a

390
00:23:52,450 --> 00:23:57,160
loved one, and yet you're doing your job,
and you're looking back on Earth.

391
00:23:57,160 --> 00:23:59,780
She's down there, and you're up there.

392
00:23:59,780 --> 00:24:01,320
Wow.

393
00:24:01,320 --> 00:24:02,320
That's heavy.

394
00:24:02,320 --> 00:24:03,320
Thanks for bringing the guitar in.

395

00:24:03,320 --> 00:24:05,160

Well, thanks for playing.

396

00:24:05,160 --> 00:24:06,900

The future.

397

00:24:06,900 --> 00:24:09,610

You've mentioned a lot of the projects that you're involved in.

398

00:24:09,610 --> 00:24:12,150

I see you're still very active on Twitter.

399

00:24:12,150 --> 00:24:17,169

You talk to schools whenever you get the chance.

400

00:24:17,169 --> 00:24:20,300

What's the big thing you're working on, and working towards?

401

00:24:20,300 --> 00:24:21,300

Yeah.

402

00:24:21,300 --> 00:24:25,240

I teach at university, I'm a professor, but I also use Skype.

403

00:24:25,240 --> 00:24:29,800

As soon as Skype was invented I thought, "Wow, I can just sit in a classroom with kids, with

404

00:24:29,800 --> 00:24:30,800

no overhead?

405

00:24:30,800 --> 00:24:32,480

They'll just type and we can have a chat?"

406

00:24:32,480 --> 00:24:35,400

So I started that back as soon as Skype was invented.

407

00:24:35,400 --> 00:24:37,620

I did it at lunchtime, called it On the Lunch Pad.

408

00:24:37,620 --> 00:24:41,809

And so I'd just sit with the kids for a half hour and answer questions.

409

00:24:41,809 --> 00:24:50,210

And the teachers use it as a way to put some science and technology and ideas into their

410

00:24:50,210 --> 00:24:52,990

regular day.

411

00:24:52,990 --> 00:24:57,710

I've written three books as well, An Astronaut's Guide to Life on Earth, which is how to lead

412

00:24:57,710 --> 00:25:01,370

a better life, and a book of pictures, and a children's book called The Darkest Dark.

413

00:25:01,370 --> 00:25:03,970

I'm writing a fourth book right now, but it's still under embargo.

414

00:25:03,970 --> 00:25:04,970

I can't tell you.

415

00:25:04,970 --> 00:25:06,429

But it is historical fiction.

416

00:25:06,429 --> 00:25:08,750

So that'll be fun.

417

00:25:08,750 --> 00:25:09,750

Historical fiction?

418

00:25:09,750 --> 00:25:10,750

Yeah.

419

00:25:10,750 --> 00:25:11,750

It'll be an interesting book.

420

00:25:11,750 --> 00:25:14,440

I'm in the process of writing it right now.

421

00:25:14,440 --> 00:25:20,250

And to me though, I think a real fundamental question is, what is this all for?

422

00:25:20,250 --> 00:25:22,610

Why are we doing these things?

423

00:25:22,610 --> 00:25:28,230

And the real comeback to it all is, how does this help me lead a better life?

424

00:25:28,230 --> 00:25:34,240

How can I look at all these ideas, and either use the technology, like something that tells

425

00:25:34,240 --> 00:25:40,240

me the temperature when my kid has a fever, or a cell phone that is using all this technology

426

00:25:40,240 --> 00:25:46,870

to communicate, or whatever, or maybe perhaps by pushing ourselves to the very edge of our

427

00:25:46,870 --> 00:25:50,220

existence, we can learn things about ourselves.

428

00:25:50,220 --> 00:25:53,559

How do you deal with fear in your life?

429

00:25:53,559 --> 00:25:55,610

How do you deal with the real dangers of life?

430

00:25:55,610 --> 00:25:58,770

How do you deal with catastrophic loss?

431

00:25:58,770 --> 00:26:05,150

How do we, as individuals, get outside the little confines of our normal life and be

432

00:26:05,150 --> 00:26:09,919

ready for the real broad complexities and richnesses of life?

433

00:26:09,919 --> 00:26:15,070

And when you push people right to the limit, sometimes that's where you experiment not

434

00:26:15,070 --> 00:26:17,809

just with the hardware, but with humanity itself.

435

00:26:17,809 --> 00:26:20,040

And to me, that's a large part of exploration.

436

00:26:20,040 --> 00:26:23,820

It's not just physical exploration, but it's also human exploration.

437

00:26:23,820 --> 00:26:30,210

And so I speak all over the world on those ideas as well, because in amongst all the

438

00:26:30,210 --> 00:26:35,559

fun technology and playing music, I think the real value is in helping as many people

439

00:26:35,559 --> 00:26:40,360

as possible look at what they've done so far
in their life, think about some of the possibilities

440

00:26:40,360 --> 00:26:44,940

that they haven't got to yet, and maybe make
a few new decisions about where they might

441

00:26:44,940 --> 00:26:45,940

head next.

442

00:26:45,940 --> 00:26:46,940

Right.

443

00:26:46,940 --> 00:26:52,640

And possibly space flight, which brings me
to ask you, do you think you'd ever go to

444

00:26:52,640 --> 00:26:53,750

space again?

445

00:26:53,750 --> 00:26:55,760

I'd love to fly in space again.

446

00:26:55,760 --> 00:26:59,680

Here at the Kennedy space center, I was over
standing next to Atlantis very recently, and

447

00:26:59,680 --> 00:27:03,620

that was a magnificent bird to be able to
fly.

448

00:27:03,620 --> 00:27:09,929

I've had a ridiculous richness of space flight,
of flying the space shuttle a few times, and

449

00:27:09,929 --> 00:27:12,820

living half a year and commanding the space
station.

450

00:27:12,820 --> 00:27:16,340

So I'm not sure I would go for a ride with no purpose.

451

00:27:16,340 --> 00:27:18,920

Imagine if someone pulled up next to you with a nice new, I don't know, a Corvette, and

452

00:27:18,920 --> 00:27:20,880

said, "Hey, you want to go for a ride?"

453

00:27:20,880 --> 00:27:22,130

And you said, "Yeah, sure."

454

00:27:22,130 --> 00:27:23,690

And you went around the block in the Corvette.

455

00:27:23,690 --> 00:27:26,360

Then he came back and the next day said, "Hey, want to go for a ride?"

456

00:27:26,360 --> 00:27:28,100

And you're like, "Okay."

457

00:27:28,100 --> 00:27:29,211

And then came back a third day.

458

00:27:29,211 --> 00:27:32,420

After a while, "Okay, I've already had a great ride in that car, but what are we going to

459

00:27:32,420 --> 00:27:34,250

do with it this time?"

460

00:27:34,250 --> 00:27:39,820

And that's sort of where I am in space flight, is what would be the purpose of it?

461

00:27:39,820 --> 00:27:47,090

The ride itself is titillating, but what are we going for, and what purpose does it serve?

462

00:27:47,090 --> 00:27:52,230

And I would love to be involved with the team that is figuring out how to successfully build

463

00:27:52,230 --> 00:27:55,830

a station around the moon, and the first settlements on the moon.

464

00:27:55,830 --> 00:27:59,630

To me, that's a huge, interesting challenge, not just going for a ride.

465

00:27:59,630 --> 00:28:01,350

But yeah, if you're offering, sure.

466

00:28:01,350 --> 00:28:03,250

I'd love to go for a ride.

467

00:28:03,250 --> 00:28:05,620

We've got some rockets and spacecraft around here, Chris.

468

00:28:05,620 --> 00:28:06,620

I'd love to.

469

00:28:06,620 --> 00:28:07,660

We'll see what we can do.

470

00:28:07,660 --> 00:28:08,660

Sure.

471

00:28:08,660 --> 00:28:12,799

We appreciate you so much taking the time to be here, not only to enlighten us with

472

00:28:12,799 --> 00:28:16,280

all of the projects you're working on, but
also playing for us.

473

00:28:16,280 --> 00:28:18,010

It was truly a treat to have you.

474

00:28:18,010 --> 00:28:19,010

My pleasure.

475

00:28:19,010 --> 00:28:20,870

And you need to bring two guitars, we can
play together next time.

476

00:28:20,870 --> 00:28:21,870

I'd love that.

477

00:28:21,870 --> 00:28:22,870

All right.

478

00:28:22,870 --> 00:28:23,870

Chris Hadfield.

479

00:28:23,870 --> 00:28:24,870

Thank you.

480

00:28:24,870 --> 00:28:26,299

I'm Derrol Nail, and that's our show.

481

00:28:26,299 --> 00:28:31,659

Thanks for stopping by The Rocket Ranch, and
special thanks to our guest, Chris Hadfield.

482

00:28:31,659 --> 00:28:35,910

To learn more about Chris and all the exciting
projects he talked about, you can go to Chris

483

00:28:35,910 --> 00:28:40,110

Hadfield, that's H-A-D-F-I-E-L-D, .ca.

484

00:28:40,110 --> 00:28:45,420

And to learn more about everything going on
at the Kennedy space center, go to nasa.gov/kennedy.

485

00:28:45,420 --> 00:28:50,929

And we've got other cool podcasts you'll find
at nasa.gov/podcasts.

486

00:28:50,929 --> 00:28:59,020

A special shout out to our producer, John
Sackman, and our soundmen Lorne Mathre and