



1  
00:00:00,320 --> 00:00:07,900  
[ Music ]

2  
00:00:07,900 --> 00:00:09,960  
>>All right ladies and gentleman, mission  
brief time.

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00:00:09,960 --> 00:00:14,360  
>> So we have four ambassadors tonight. We  
have Kim Abegglen?

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00:00:14,360 --> 00:00:16,060  
Anna-Melissa Lyons?

5  
00:00:16,060 --> 00:00:18,000  
Hi, Anna-Melissa.

6  
00:00:18,000 --> 00:00:20,940  
Robert Black?

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00:00:20,940 --> 00:00:22,939  
David Bloomsness?

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00:00:22,939 --> 00:00:26,639  
>> As far as your planned route of flight,  
it looks like the most significant winds are

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00:00:26,640 --> 00:00:28,480  
going to be about 60 knots.

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00:00:28,480 --> 00:00:32,520  
>> The cockpit door is always open. Come upstairs  
and visit. We're always up there, obviously,

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00:00:32,529 --> 00:00:34,600  
so, we welcome visitors anytime!

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00:00:34,600 --> 00:00:39,360

>> The long leg up in Canada is IRAS03064 plus

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00:00:39,360 --> 00:00:40,760

something, something, something.

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00:00:40,760 --> 00:00:42,680

This is a massive star-forming region

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00:00:42,680 --> 00:00:46,740

that still has deeply embedded objects,  
and we're going to be trying to actually characterize

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00:00:46,740 --> 00:00:47,840

these objects.

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00:00:47,840 --> 00:00:54,320

Then we turn on to V Vul, which is a highly  
evolved star. It's a yellow supergiant

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00:00:54,320 --> 00:00:56,040

entering the last stages of its life.

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00:00:56,040 --> 00:01:00,540

>> This is a stellar merger. It's been thought  
for a long time that once in a long while,

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00:01:00,540 --> 00:01:04,700

stars- binaries, orbiting very close  
together- finally merged.

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00:01:04,700 --> 00:01:09,200

[ Music ]

22

00:01:16,320 --> 00:01:18,880

[Door slam]

23

00:01:22,480 --> 00:01:26,660

[Background talking]

24

00:01:26,660 --> 00:01:30,340

[Airplane takes off]

25

00:01:33,660 --> 00:01:45,980

[Radio chatter]

26

00:01:48,480 --> 00:01:56,240

[Music]

27

00:01:56,240 --> 00:02:00,600

>> My name is Anna-Melissa  
Lyons. I am a middle school math teacher in

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00:02:00,609 --> 00:02:02,240

Brush Prairie, Washington.

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00:02:02,240 --> 00:02:06,159

>> My name is Robert Black.  
I'm a high school astronomy teacher and planetarium

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00:02:06,159 --> 00:02:08,399

director in Medford, Oregon.

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00:02:08,400 --> 00:02:12,400

>> My name is Kim Abegglen and  
I'm from Vancouver, Washington. And I teach

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00:02:12,410 --> 00:02:14,800

seventh and eighth grade sciences.

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00:02:14,800 --> 00:02:18,780

>> My name is Dave Bloomsness.  
I am from Medford, Oregon. I'm a locksmith

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00:02:18,780 --> 00:02:22,390

by trade, but I'm an amateur astronomer by  
heart. I've been an amateur astronomer for

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00:02:22,390 --> 00:02:23,750  
almost 30 years.

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00:02:23,750 --> 00:02:24,870  
>> Our passion is really

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00:02:24,870 --> 00:02:29,390  
to encourage middle school kids to get excited  
about math and science.

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00:02:29,390 --> 00:02:32,300  
[Music]

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00:02:32,300 --> 00:02:36,020  
>> I like watching the telescope when we hit  
turbulence. It kind of dances around. It's

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00:02:36,030 --> 00:02:38,740  
actually holding still and we're moving.

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00:02:38,740 --> 00:02:44,360  
>> When's the last time you guys stayed up  
till 2 a.m.? The 70s? That doesn't count.

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00:02:44,360 --> 00:02:48,480  
>> The opportunity to ask questions, to be  
able to investigate and ask, why are things

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00:02:48,480 --> 00:02:52,640  
the way that they are, is what got me into  
science. And it's the thing that keeps my

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00:02:52,640 --> 00:02:57,730  
interest. There's always a question left to  
be answered and to gather more information

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00:02:57,730 --> 00:02:59,260  
about, so let's keep asking.

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00:02:59,260 --> 00:03:03,060

>> Essentially, we do chopping and nodding because we're overwhelmed by the background.

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00:03:03,060 --> 00:03:08,849

The sky is emitting. The telescope itself is emitting. Everything, right at the wavelengths

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00:03:08,849 --> 00:03:12,730

we're observing at. For every one photon we're getting from this target, typically we get

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00:03:12,730 --> 00:03:16,250

100,000 protons from the sky or from the telescope, so if we just stare at it and take

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00:03:16,250 --> 00:03:20,379

like a normal digital camera image, we'd see this. We don't see any spectra there at all.

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00:03:20,380 --> 00:03:25,200

Skylines. All we're seeing is the sky. And then what we do is quickly back and forth,

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00:03:25,200 --> 00:03:29,519

we do this chopping and such and so that removes the sky. Then we get a nice clean image right

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00:03:29,519 --> 00:03:30,559

there.

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00:03:30,559 --> 00:03:35,489

>> So the red is the atmospheric transmission from Mauna Kea. We're going to have this relatively

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00:03:35,489 --> 00:03:39,840

transparent window here and then it's going to be almost completely opaque in this region

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00:03:39,840 --> 00:03:43,080

there. Those are the regions where, if you look in the infrared, it's going to be very

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00:03:43,080 --> 00:03:43,520  
bright.

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00:03:43,529 --> 00:03:49,760  
>> I got a chance to go up to the FORCAST instrument where they showed us the difference

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00:03:49,760 --> 00:03:55,900  
between the visible light photo and the infrared data. This one image we were looking at is

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00:03:55,900 --> 00:04:01,819  
the visible light spectrum- it's black because they're looking at a giant dark cloud. With

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00:04:01,819 --> 00:04:04,629  
the FORCAST instrument for the infrared, there's something there.

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00:04:04,629 --> 00:04:09,260  
>> Some of the targets tonight on the list are some of the heavyweights in astronomy.

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00:04:09,260 --> 00:04:15,709  
We're going to look at a supernova, a star that exploded in 2010, or at least that's

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00:04:15,709 --> 00:04:20,190  
when we got to see it here on Earth. I mean those are exciting. That's where all the heavier

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00:04:20,190 --> 00:04:21,660  
elements are created.

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00:04:21,660 --> 00:04:25,400  
>> We're using grism spectroscopy and so what these investigators are trying to do is to

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00:04:25,400 --> 00:04:30,780  
look at all that material that has been blown out and characterize not only what elements

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00:04:30,780 --> 00:04:35,750  
are in that material just to see how much processing has been done, but then also to

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00:04:35,750 --> 00:04:40,440  
look at the dust that is being released and formed in that material that is being blown out.

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00:04:40,440 --> 00:04:44,860  
>> Tonight, we're also going to be looking at an amazing star merger. As I was researching

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00:04:44,860 --> 00:04:51,860  
before tonight, there's absolutely no information on why these two stars would have merged and

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00:04:51,860 --> 00:04:55,920  
what's the mechanism for that. So it's at the edge of science.

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00:04:55,930 --> 00:05:00,560  
>> Before a nova, a star will act peculiar. They found that it was regularly variable

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00:05:00,560 --> 00:05:06,470  
in the patten that is uniquely for eclipsing binaries. It was an eclipsing binary; after

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00:05:06,470 --> 00:05:11,099  
the outburst, no more eclipsing binary. It's kind of open and shut.

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00:05:11,099 --> 00:05:16,539  
I would say that the study of stellar mergers is not even in its infancy. This is kind of

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00:05:16,539 --> 00:05:17,999

unusual astronomy.

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00:05:17,999 --> 00:05:20,659

>> The last project was a binary star that's

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00:05:20,669 --> 00:05:25,060

combining into one. And it's a type of star that doesn't normally do that, and that's

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00:05:25,060 --> 00:05:27,740

something I didn't even know about before this.

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00:05:27,740 --> 00:05:30,040

[Music]

82

00:05:30,050 --> 00:05:33,520

>> All teachers. We get the when are we ever going to use this or why is this important?

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00:05:33,520 --> 00:05:38,069

I'm really trying to show them why it's important. How they can use it. How it's applied in the

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00:05:38,069 --> 00:05:44,029

real world. Astronomy isn't just looking at a star, but it's so much more. It's chemistry. It's math

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00:05:44,030 --> 00:05:48,520

>> This experience allows me to go back and say, here is what scientific inquiry looks

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00:05:48,520 --> 00:05:50,720

like in this particular context.

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00:05:50,720 --> 00:05:55,660

>> I think when a teacher, an instructor,

or professor is excited, that excitement is

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00:05:55,669 --> 00:05:57,870

pretty easy to transfer to your students.

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00:05:57,870 --> 00:06:01,590

>> This has been a really great opportunity for me. It gives me a deeper appreciation

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00:06:01,590 --> 00:06:05,560

of astronomy, and it also actually widens my interest in astronomy. I want to learn

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00:06:05,560 --> 00:06:07,630

more about things that I haven't really delved into.

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00:06:07,630 --> 00:06:12,860

Then as far as the community, we'll be doing outreach, I'm giving talks, and when we do star parties,

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00:06:12,860 --> 00:06:15,280

we'll be referring to this as our experience.

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00:06:15,280 --> 00:06:22,440

>> Imagine the possibilities. I am in a plane, 39,000 feet, amongst scientists looking at

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00:06:22,440 --> 00:06:27,140

the stars and trying to make sense of the things that they're seeing, trying to gather information.