



1  
00:00:00,051 --> 00:00:02,051  
[Silence]

2  
00:00:02,096 --> 00:00:04,006  
>> With three major  
laboratories on board,

3  
00:00:04,006 --> 00:00:08,196  
that includes the U.S.  
Laboratory Destiny,

4  
00:00:08,196 --> 00:00:13,076  
this Japanese laboratory Kibo  
and also the Columbus Laboratory

5  
00:00:13,076 --> 00:00:14,556  
of the European Space Agency,

6  
00:00:14,556 --> 00:00:18,366  
a number of experiments are  
always ongoing aboard the

7  
00:00:18,366 --> 00:00:23,026  
station even when the crew  
is not required to interact

8  
00:00:23,026 --> 00:00:24,196  
with those experiments.

9  
00:00:24,196 --> 00:00:26,806  
A lot of the experiments  
can be conducted

10  
00:00:27,336 --> 00:00:30,336  
and the crew perform  
status checks periodically.

11  
00:00:31,126 --> 00:00:34,626  
In addition to the

burning and suppression

12

00:00:34,626 --> 00:00:37,786  
of solids experiment, there's  
also an additional experiment

13

00:00:37,786 --> 00:00:40,946  
that tests how flames are  
extinguished in space.

14

00:00:41,646 --> 00:00:43,586  
>> I like to call  
it hot research.

15

00:00:43,886 --> 00:00:46,796  
It's the Flame Extinguishment  
Experiment or FLEX

16

00:00:47,036 --> 00:00:48,386  
and crew members  
have been working

17

00:00:48,386 --> 00:00:49,996  
on this experiment  
in recent weeks.

18

00:00:50,396 --> 00:00:52,596  
I had the opportunity to talk  
to one of the investigators

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00:00:52,946 --> 00:00:55,976  
about why and how they  
study flames in space.

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00:00:56,916 --> 00:01:00,496  
>> Basically we're trying to  
understand how we can be safer

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00:01:00,496 --> 00:01:04,096  
in space by understanding

when flames burn

22

00:01:04,096 --> 00:01:07,156

and the conditions  
where flames go out.

23

00:01:07,356 --> 00:01:09,386

We're looking for  
that boundary position

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00:01:09,386 --> 00:01:12,916

where one moment  
your flame is alive

25

00:01:12,916 --> 00:01:14,936

and the next moment your  
flame is extinguished.

26

00:01:15,446 --> 00:01:18,996

And so we've been taking  
a look at different fuels

27

00:01:18,996 --> 00:01:22,566

and different conditions  
in the chamber,

28

00:01:22,566 --> 00:01:26,036

different atmospheric pressures,  
different suppressants.

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00:01:26,036 --> 00:01:27,646

And we're looking  
for those places

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00:01:27,686 --> 00:01:29,406

where the flame goes  
out and why.

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00:01:30,626 --> 00:01:32,916

>> Flames act a lot

differently in space, right?

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00:01:33,046 --> 00:01:33,976

>> Absolutely.

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00:01:33,976 --> 00:01:38,726

In space, we've learned  
that fires burn

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00:01:38,986 --> 00:01:40,386

at a slower burning rate.

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00:01:40,666 --> 00:01:46,496

That they burn at a lower  
temperature but they burn

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00:01:46,496 --> 00:01:48,396

at a lower oxygen concentration

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00:01:48,496 --> 00:01:50,996

which makes them a little  
bit more dangerous for crew.

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00:01:51,106 --> 00:01:53,816

You might put your  
hand on a panel

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00:01:53,816 --> 00:01:55,046

and you might not feel the fire.

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00:01:55,046 --> 00:01:58,826

It's harder to detect fires  
in space because the lack

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00:01:59,236 --> 00:02:01,306

of gravity means  
there's no buoyancy.

42

00:02:01,416 --> 00:02:04,866

There's no reason for the  
flames to ascend smoke

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00:02:04,866 --> 00:02:06,586

up across the ceiling  
like they do on Earth.

44

00:02:07,086 --> 00:02:10,056

So it's harder for a smoke  
detector to detect the fires

45

00:02:10,396 --> 00:02:14,006

and because it burns at a  
lower oxygen concentration,

46

00:02:14,356 --> 00:02:16,716

it allows fires to  
continue to burn

47

00:02:16,716 --> 00:02:18,256

after maybe you think  
you've put them out.

48

00:02:18,926 --> 00:02:22,646

>> Wow. So how do crew  
members handle flames in space?

49

00:02:23,306 --> 00:02:26,146

>> Well we do have some  
space based smoke detectors

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00:02:26,146 --> 00:02:29,336

which are -- have been  
redesigned through our research

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00:02:30,456 --> 00:02:34,246

to look at larger  
particles because soot tends

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00:02:34,246 --> 00:02:35,376

to grow larger in space.

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00:02:35,766 --> 00:02:37,346

We have more detectors.

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00:02:37,346 --> 00:02:40,866

Some behind various panels  
and we have different kinds

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00:02:40,866 --> 00:02:42,976

of suppressants but those are  
the things we're still studying

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00:02:42,976 --> 00:02:45,026

as we try to find the  
most effective ways

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00:02:45,316 --> 00:02:46,366

of putting out the fires.

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00:02:46,916 --> 00:02:48,626

>> So it obviously has  
space applications but what

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00:02:48,626 --> 00:02:51,186

about for folks here on Earth?

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00:02:51,186 --> 00:02:54,596

>> Our research also extends  
to some fundamental research

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00:02:54,596 --> 00:02:56,676

and allows us to take a look

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00:02:56,676 --> 00:02:59,396

at our computer models  
and our equations.

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00:02:59,766 --> 00:03:03,826

And literally we're going to by  
operating in space, take gravity

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00:03:03,826 --> 00:03:07,236

out of the equation which  
makes our equation simpler,

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00:03:07,236 --> 00:03:10,176

our computer models are  
simpler, and it allows us

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00:03:10,176 --> 00:03:15,426

to then use those models for  
redesigning furnaces and engines

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00:03:15,426 --> 00:03:18,656

and combustors on Earth to  
be more efficient to allow us

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00:03:18,656 --> 00:03:23,836

to use less fuel, create less  
greenhouse gases, and less soot.