

Thaxted Astronomical Society

News

Features

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SpaceX Launch Two
Astronauts To The ISS

<https://www.dailymail.co.uk/sciencetech/article-8372023/How-Britons-watch-Elon-Musks-SpaceX-rocket-shooting-overhead-10-15pm-TONIGHT.html>

'It's a go': Elon Musk blasts two astronauts into space in historic SpaceX launch to the ISS bringing back manned spaceflight to America for the first time in NINE years as Trump watches from pad

Daily Mail 31st May 2020 >

- **NASA and SpaceX have launched the Falcon 9 from Kennedy Space Center to the International Space Station**
- **Astronauts Bob Behnken and Doug Hurley took off in Crew Dragon atop Falcon 9 at 3.22pm Eastern Time**
- **This was the second attempt of Launch America - the initial launch was scrubbed Wed. due to poor weather**
- **Falcon 9 has been retrieved by SpaceX's autonomous drone ship and Crew Dragon is heading to the ISS**
- **Hurley and Behnken are set to dock with the ISS in 24 hours where they will join the Expedition 63 crew**

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Behnken (left) and Hurley (right) conduct a series of pre-flight checks in the Dragon Crew capsule



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NASA and Elon Musk's SpaceX have officially brought spaceflight back to US with the successful launch of the Falcon 9 rocket from Kennedy Space Center in Cape Canaveral, Florida.

Astronauts Robert Behnken and Douglas Hurley took off from Launch Complex 39A at 3:22pm Saturday – the first time in nine years an American crew has launched from US soil.

'Let's light this candle,' commander Hurley said just before liftoff.

The Launch America mission is also the first time a private company has put astronauts into space and is the second attempt to launch after Wednesday's flight was aborted due to poor weather conditions.

After reaching orbit, Falcon 9 successfully returned to Earth and was retrieved by SpaceX's autonomous spaceport drone ship 'I Still Love You.'

The Crew Dragon is now taking the 19-hour journey to the International Space Station, where Behnken and Hurley will join the Expedition 63 crew.

The International Space Station was only accessible to NASA astronauts through the purchase of seats on Russian capsules launched from Kazakhstan - but that has all changed as of today.

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Height: 229ft 6in

Dragon capsule

Solar panels

2nd stage with one Merlin rocket

Inter stage

Grid fins

FALCON 9 LAUNCH VEHICLE '1st stage' with nine Merlin rockets (thrust greater than five Boeing 747 airliners)

Landing legs stowed for launch

1 4.33pm local time (9.33pm GMT)
 SpaceX Falcon 9 blasts off from Canaveral Air Force Station, Florida

2 2min 34sec
 The Falcon 9's first-stage rocket splits from its second-stage

3 7min 7sec
 Cold gas boosters turn first stage to a vertical alignment for return to Earth

4 9min 9sec
 Rocket booster decelerates stage to 13mph and it lands six miles from the launch site

5 12min 0sec
 Dragon capsule separates from second-stage

6 49min 6sec
 Initial thruster burn to catch up to the International Space Station

7 19hr 6min 25sec
 Dragon will dock with the space station in a mission that could last up to four months

Docking hatch

Astronauts Douglas Hurley and Bob Behnken inside SpaceX's capsule

HOW IT COMPARES

Falcon 9	Saturn V	Space shuttle	Soyuz
229.5ft	363ft	184ft	150ft

Hydraulic rams lower the carbon fibre legs for landing

Falcon 9's 156ft long first stage is equipped with hypersonic grid fins which steer it on to the landing site

Elon Musk: Founder of SpaceX

Graphic by John Lawson

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Crew Dragon should be in position to dock with the ISS about 24 hours after takeoff and will connect to the ship autonomously.

After successfully docking, Behnken and Hurley will join the other members on the space station and become part of the Expedition 63 crew.

The two men are scheduled to stay up to four months, after which they will come home with a Right Stuff-style splashdown at sea.

'I would be lying to you if I told you I wasn't nervous,' Bridenstine said before the launch attempt. 'We want to do everything we can to minimize the risk, minimize the uncertainty, so that Bob and Doug will be safe.'

NASA urged people to stay safe and watch from home due to the coronavirus, and by NASA's count, over 3 million viewers tuned in online.

However, spectators began lining the Cape Canaveral area's beaches and roads with signs along the main beach drag that read 'Godspeed.'

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Both NASA and SpaceX said they would be 'proceeding with countdown' despite a 50 percent 'weather cancellation risk' amid concerns over possible thunderstorms and rain around the Kennedy Space Center at Cape Canaveral early Saturday morning.

Bridenstine said during an afternoon briefing: 'We are predicting a 50, 50 shot of going this time.'

'But because we are in late May, we have to take any shot we can get.'

'We almost made it on Wednesday and the trend is better today than it was on Wednesday.'

The biggest concern was lighting, precipitation, cumulus clouds and anvil clouds - all of which could ground Falcon 9 until Sunday.

However, about 45 minutes to launch, all requirements went from red to green and a SpaceX official said 'weather is a go.'

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The launch pad where Falcon 9 took off from is the same one used by NASA's last space shuttle flight, piloted by Hurley, in 2011.

Since then, NASA astronauts have had to hitch rides into orbit aboard Russia's Soyuz spacecraft.

Earlier today, Behnken and Hurley had a social distancing farewell with their families who met them outside of the Kennedy crew quarters before they took the journey to Launch Complex 39A

Due to the policy, the team had to stand six-feet from their wives and children and say goodbye with air hugs.

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Behnken and Hurley were met by their wives and children before heading to Falcon 9, but had to keep with the social distance policy and were only able to send air hugs and blow kisses



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After saying farewell, the pair loaded into a white Tesla Model X with bright blue NASA stickers on each of the doors and the 'worm' logo on the back windshield



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Before saying goodbye, Behnken and Hurley suited up in the new spacesuits developed by Musk with the help of costume designer Jose Fernandez with envisioning the prototype.

Fernandez, who has worked on 'The Avengers' and 'X-Men', revealed that Musk wanted the crew to look better in the suit than without it, 'like a tux.' 'Musk kept saying, anyone looks better in a tux, no matter what size or shape they are,' he said in an interview with Bleep.

'I personally spent a lot of time — it took us three, almost four years to design these suits that both look good and work well,' Musk said during NASA's live coverage of the launch attempt on Wednesday..

You see the spacesuits in the movies — they look good, they don't work well.'

'You can make a spacesuit that works, but it doesn't look good, because fundamentally it's a pressure suit that has to survive in a vacuum.'

The suits were constructed in Hawthorne, California, which is the same facility where SpaceX keep its rockets.

The Spacesuits are custom-made for each passenger aboard Crew Dragon and designed to be functional, lightweight and to offer protection from potential depressurization.

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The SpaceX suits have been jointly designed by a Hollywood costume designer and by Elon Musk



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For Musk, the launch represents another milestone for the reusable rockets his company pioneered to make spaceflight less costly and frequent.

And it would mark the first time that commercially developed space vehicles - owned and operated by a private entity rather than NASA - have carried Americans into orbit.

Musk said on Wednesday he accepted absolute responsibility if today's historic launch of his Falcon 9 rocket ended in tragedy.

Musk told CBS This Morning: 'I'm the chief engineer of this thing so I'd just like to say that if it goes right, it's credit to the SpaceX-NASA team. If it goes wrong, it's my fault.'

Asked whether there was one thing about this afternoon's launch that kept him up at night, he added: 'There's thousands of things that can go wrong and only one thing that can go right.'

The last time NASA launched astronauts into space aboard a brand new vehicle was 40 years ago at the start of the shuttle program.

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Musk, the South African-born high-tech entrepreneur who made his fortune in Silicon Valley, is also the chief executive of electric carmaker and battery manufacturer Tesla Inc.

He founded Hawthorne, California-based SpaceX, formally known as Space Exploration Technologies, in 2002.

Aerospace giant Boeing Co, producing its own launch system in competition with SpaceX, is expected to fly its CST-100 Starliner vehicle with astronauts aboard for the first time next year.

NASA has awarded nearly \$8billion to SpaceX and Boeing combined for development of their rival rockets.

Wednesday's launch was cancelled with less than 17 minutes remaining on the countdown clock as bad weather meant the launch had to be delayed by a few seconds around the Kennedy Space Center.

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How SpaceX astronauts quarantined to keep coronavirus off the ISS

Pre-launch quarantine periods are standard procedure for any space flight.

Crew Dragon's astronauts, Bob Behnken and Doug Hurley went into quarantine on May 13 - two weeks ahead of their original scheduled liftoff. They were given the option to quarantine at home if members of their households would not be coming and going.

Behnken and Hurley stayed at their homes - because their families were already quarantining due to the pandemic - until they were required to report to the Kennedy Space Center on May 20, according to Space Flight Now.

Both astronauts got daily temperature checks in the weeks leading up to Wednesday's launch. Their interactions with others have been limited, and anyone who would have to come into contact with them also had to get a daily temperature check.

During training, staff had to stay six feet away from each astronaut and wore masks. Staff were also required to keep quarantine protocols, stay socially distanced and wear protective gear when they needed to closely interact with the astronauts and support crew.

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Although the astronauts continued to have contact with one another, many of the training exercises that would normally come with hands-on instruction and adjustments were instead attended virtually by staff.

Mr Behnken and Mr Hurley have undergone at least two coronavirus tests.