**JWST – A BEACON FOR SCIENCE**

**A-ROLL**

**Suggested web copy [caption for the website]:**

Astronomers all over the world are eagerly awaiting the launch of the James Webb Space Telescope. The infrared space telescope, which will carry the largest astronomical mirror ever flown in space is one of the most complex observatories ever built. It will allow unprecedented science, including investigations into the atmospheres of exoplanets and the formation of galaxies, addressing fundamental questions in astronomy. ESA and the Canadian Space Agency are partners in the NASA-led international project, which will launch in 2021 on a European Ariane 5 rocket.

These films contain interviews with Olivia Jones, UK Astronomy Technology Centre (English), Hannah Wakeford, Space Telescope Science Institute (English), Stephen Wilkins, University of Sussex (English), Antonella Nota, ESA JWST project scientist for Guest Observers (English A-roll; Italian and English B-roll), Gillian Wright, European Principal Investigator for JWST MIRI instrument (English B-roll only).

**A-ROLL**

**TAPE STARTS: 10:00:00**

**VT STARTS: 10:00:10**

**10:00:10**

**[JWST ANIMATION - CREDIT: NASA]**

The James Webb Space Telescope will be the biggest optical and infrared astronomical observatory ever placed in orbit. Its sunshield is the size of a tennis court and it has a six and a half metre mirror, in honeycomb shaped sections, equivalent to a building three storeys high. But it’s not just the size and cutting-edge technology that is exciting astronomers and space scientists. It’s what the telescope will allow them to do. Because its sensitive and sharp infrared vision can help address a number of key questions, such as the cycle of elements early on in the history of the Universe.

**10:00:49**

**[INSET CLIP: Olivia JONES, UK Astronomy Technology Centre]**

*“It’s unprecedented. We can’t touch upon any of these starts of early star formation. We don’t know how these elements produced, we don’t know is it supernovas or dying stars like our Sun that are important in these galaxies. We can’t see that with any instrumentation that currently exists or that’s even thought of. James Webb is the only instrument and I can’t wait to see what it is going to be able to do.”*

**10:01:15**

**[TELESCOPE IN CLEAN ROOM, NASA JPL, AND SHOTS OF SPACE TELESCOPE SCIENCE INSTITUTE, BALTIMORE, USA]**

The observatory is an international project involving NASA, ESA and the Canadian Space Agency. It will be operated from the Space Telescope Science Institute in Baltimore and one of its many capabilities will be to characterise the atmosphere of known exoplanets.

**10:01:32**

**[INSET CLIP:Hannah WAKEFORD, Space Telescope Science Institute]**

*“What going to be doing is we’re going to be looking at these planets as they pass in front of their star and take snapshots as they’re doing that and this creates like a time series of observation. So we can look at planet as it passes in front of the star and blocks out that light. And from that what we’re looking for is the signatures of the starlight that shines through the atmosphere before it reaches the telescope and imprinted on that light is fingerprints of different molecules and that’s what we’re looking for - to understand what’s the nature of these atmospheres, what are they made of and what are these environments like on these worlds.*”

**10:02:08**

**[EWASS CONFERENCE GVs, LIVERPOOL, APRIL 2018]**

Back on Earth, at a recent astronomy conference in the UK, everyone was looking forward to what will be achieved once the telescope is in orbit.

**10:02:17**

**[INSET CLIP:Stephen WILKINS, University of Sussex]**

*“I think the great thing about Webb is that it actually touches all of astronomy. Because it’s so flexible you can use it study things inside our own solar system but you can also use it to find examples of the very first galaxies so it really is spanning almost the entire history of the Universe.”*

**10:02:34**

**[HUBBLE DEEP FIELD IMAGES. CREDIT: NASA, ESA, STScl]**

Astronomers have made giant steps in our understanding of the Universe over the past decades, but there remains much to learn about our cosmic origins. And the range of questions waiting to be answered is causing high expectations.

**10:02:53**

**[INSET CLIP: Antonella NOTA, JWST Project Scientist, ESA]**

***“****From solar systems to cosmology, stellar populations so we’re very excited what we will be able to do and, as usual for these observatories, the greater prize will be the unexpected, anything that we can’t even dream of right now but what we’ll do.”*

**10:03:09**

**[JWST AND LAUNCH ANIMATION]**

The James Webb space telescope will complement existing observatories but, with its unprecedented combination of infrared vision, increased sensitivity and image sharpness, it will also be a huge leap forward. We are still a few years away from the telescope’s launch but, like all the best things in life, it is definitely worth the wait.

**10:03:35 [ENDS]**

**JWST - A Beacon for Science B-ROLL**

**10:03:35**

**[TITLE] Hannah Wakeford**

**Space Telescope Science Institute [English]**

*“The James Webb SpaceTelescope is brilliant in a number of ways. One it extends our wavelength all the way into the infrared, into the mid infrared, so we can look at the heat signatures from these planets as well. But that also means we can cover the fingerprints of different materials in the atmosphere. The Hubble space telescope looks for finger-prints of sodium and potassium and water in the atmospheres of these worlds but the James Webb Space Telescope is going to be able to look for signatures of methane and carbon dioxide and carbon monoxide as well as all of these wonderful water features we will be seeing in these giant planets’ atmospheres. But not only can it tell us in these different wavelength ranges, it’s actually better resolution so we can get more data points for each of these different molecules and it’s a much bigger telescope, we’re collecting far more light, we can get much better precision. So that means that the degree to which we believe our measurements is going to improve a lot with this telescope and that’s going to mean that we’ll be able to tell you with confidence what we’re measuring.”*

*"Looking for life on other planets is the ultimate future goal of all of these missions, trying to understand how we got here, how the Earth is the way it is. The James Webb Space Telescope is taking us one step further towards that goal. We’re going to be pushing to these smaller worlds, where we can see what different planets, that are unlike ones in our Solar System, are like; how atmospheres change with the size of your planet and it’s also give us information on these giant planets that we don’t have in our Solar System so close to their star that they are hotter than a rocket. They’re different worlds that we can explore with this and every technique that we use with the James Webb Space Telescope is going to be the technique we need to be looking for life signatures on these other worlds. So getting good at using this technique is so important so that in the future we can be looking for these signatures.”*

**10:05:43**

**[TITLE] Olivia Jones**

**UK Astronomy Technology Centre [English]**

***“****I’m really excited about James Webb and the spectroscopic capabilities. It’s absolutely revolutionary - the sensitivity and the resolution we can get to look at the dust and the forming stars in some of the very most distant galaxies to us, where we can actually see individual stars and work out what the chemical compositions they’re producing in terms of dust and the minerals they’re producing and the life cycle of matter in the universe. Like chemical evolution of galaxies. No other instrument, no ground based instrument can do this because of the atmosphere. Only space based instruments can do this and previously, the previous generations have been so small they can only look at galaxies in the Milky Way or in the Magellanic clouds. So James Webb can push that envelope out to lots of galaxies in the local group. And so we can look at different formation scenarios towards the early unIverse. So that’s what I’m most excited about - is these dying stars and forming stars.”*

**10:06:47**

**[TITLE] Stephen Wilkins**

**University of Sussex [English]**

*“I think the great thing about Webb is that it actually touches all of astronomy. Because it’s so flexible you can use it to study things inside our own solar system but you can also use it to find examples of the very first galaxies. So it really is spanning almost the entire history of the universe. So it’s really going to be transformative to lots of different areas. I think the two areas that are going to be transformed the most are my own field - which is finding and understanding these very early galaxies - and then on other end of the scale, actually looking at planets around other stars that are relatively nearby to us. But I think every single astronomer in the world will ultimately be taking some of the results from Webb an incorporating it into their own research.”*

**10:07:37**

**[TITLE] Antonella Nota**

**JWST Project Scientist, ESA [English]**

*“James Webb is very complimentary to everything that has been done before, to Hubble, to Herschel but will be a huge step forward just because the collective area is huge - 6.5 metre mirror is pretty impressive. Hubble, as a comparison, was 2.4. So we’re talking of a collective area which is much bigger, much more sensitivity. We say 100 times more sensitive with a complement of state of the art instruments which will take images and spectra in wavelength regimes that we haven’t explored as much from space up till now.”*

**10:08:27**

**[TITLE] Antonella Nota**

**JWST Project Scientist, ESA [Italian]**

How JWST will build on the work of other observatories.

How astronomers will use the JWST data.

The difference JWST will make to astronomers when it is operational.

**10:11:10**

**[TITLE] Gillian Wright**

**European Principal Investigator for MIRI Instrument [English]**

*“So as a practical matter you have to somehow divide up the work in ways that are efficient so you do tend to have one part made in one country, and another part made in another country. But in the end they all have to work together and that’s something that my UK team has spent a lot of time doing, is making sure that when there’s an interface say between something that’s been built in France and something that was built in Belgium or Germany, that when they come together it all works. And then the whole instrument came together in the UK but then there’s another part of the instrument that’s been developed at the Jet Propulsion Laboratory in the US which is the MIRI cooler. And the MIRI cooler was wholly developed in the US because that’s where they have the expertise. But it’s only partly fixed to our instrument and some of it has to be fixed to other parts of the James Webb Space Telescope so it actually has a very complicated path in terms of all the different parts of it coming together and having to work.”*

*“Lots of big question. How do galaxies evolve? So the Hubble deep field has given us some hints of what we think is happening but we haven’t been able to see it in enough detail or with enough galaxies to really know so it’s going to fill in - almost you could think of it as a gap in time between the Big Bang and the galaxies we can study with Hubble and we’ll find galaxies that are within that gap. So that’s one big unknown. Another big unknown is to characterise planets that are orbiting other stars. Now astronomers have got very good at finding these planets. But what we want to do is look at what they’re made up, so what’s in their atmospheres or, if they were rocky, what kinds of minerals are we seeing? And to be able to do that I think would be stupendous.”*

**10:13:24**

**[GEN ENDS]**