**Gaia: astronomical revolution (RH FINAL 16.10.19)**

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Launched in December 2013, the Gaia mission is revolutionising our understanding of the Milky Way. The space telescope is mapping our galaxy in unprecedented detail – measuring the position, movement and distance of stars.

At a meeting in Groningen in the Netherlands, scientists have been discussing the challenge of processing and visualising Gaia data.

Latest science results from the mission, also discussed in this A and B-roll, include a new understanding of how stars cluster together and the fact that today’s Milky Way was formed from a merger of galaxies.

**A-ROLL**

**10:00:10**

**Gaia space telescope animation**

Rotating slowly, one and half million kilometres from Earth, Gaia is scanning the entire Milky Way. Since 2014, the mission has been mapping the distance, position and movement of 1.7 billion stars to reveal our galaxy as never before.

**10:00:31**

**Fred Jansen**

**ESA Gaia Mission Manager**

*The scientific impact of the mission already is immense. We see 3, 4 papers appearing per day. We're touching virtually every area of astrophysics, from very fundamental predictions of 50 years ago to new things that you see and the dynamics and the history of our own galaxy*

**10:00:49**

**Exterior of campus and telescope into set-up shots of Groningen University telescope**

Capturing 70 measurements of every star, Gaia produces vast amounts of data.

At a meeting in Groningen in the Netherlands, scientists have been discussing the challenge of processing and visualising this information.

**10:01:08**

**Jackie Faherty**

**Astrophysicist, American Museum of Natural History**

*Gaia is probably one of humanity's greatest missions. One of the greatest catalogues of data that currently exists for humans to go through and it's almost impossible to give you all of the ways in which Gaia is impacting astrophysics.*

**10:01:25**

**Interior telescope into visualisation of star clusters**

Earth bound observatories provide a snapshot of celestial objects in the night sky.

But, by measuring how the stars are moving and visualising that data, astrophysicists are using Gaia to trace the history and evolution of the Galaxy.

They’ve discovered, for instance, that stars born together in star forming factories, move in clusters, or families…throughout most of their lives.

**10:01:52**

**Jackie Faherty**

*It is mindblowing. I can’t believe we can do this.**I could never have dreamed that we could pull away from our position on the Earth and actually see the structure of these kinds of associations. And then you can run time forward and see exactly how they're moving. You can compare and contrast how they're all moving differently. And I think it's a story of vast proportions in our understanding of how stars form and evolve.*

**10:02:21**

**Visualisation of Galactic merger and Helmi set-up shots**

Other science teams have used Gaia data to confirm today’s Milky Way is formed from giant galactic mergers…

**10:02:43**

**Amina Helmi**

**Astrophysicist, University of Groningen**

*So most of the stars in the Milky Way rotate like the sun, they go around in a clockwise sense. And so for example we discovered last year a very large group of stars that are going the other way round. And so that's already very suspicious. And it tells you kind of that the stars were formed elsewhere. Being such a large group and it was a very old star. So that was already the first hint that actually one component of the galaxy is probably made up from stars born somewhere else.*

**10:03:13**

**Gaia animation**

Across Europe, hundreds of people work on the Gaia mission – ensuring the data is accessible to everyone. With more data releases expected in the 2020s, there are likely to be plenty more revelations to come…

**10:03:17**

**Fred Jansen**

*Gaia is currently in an extension of the original five-year mission. We have fuel for another five years. What we do is we gather more data. We get better statistics and then we can derive more precise results.*

**10:03:31**

**Gaia animation**

Gaia is not only mapping the stars…it’s giving us a new sense of our place in the universe.

**10:03:45 A-roll ends**

**B-ROLL**

**10:03:45**

**Fred Jansen**

**ESA Gaia Mission Manager**

Additional soundbites to A-roll (English)

*What we can already see is that our Milky Way has had a very dynamic past encounters with other galaxies which almost ripped our own galaxy apart. We see the aftermath of that. We see the solar neighbourhood star streaming in one direction together while theory says they should disperse.*

*It's incredibly rewarding to see such wonderful science coming out but the actual data crunching is a few hundred people throughout Europe sweating every day of the week. So there is a counter side to this wonderful result and that's the hard work of a lot of people.*

**10:04:36**

**Fred Jansen**

**ESA Gaia Mission Manager**

Soundbites (Dutch) x5

**10:06:32**

**Jackie Faherty**

**Astrophysicist, American Museum of Natural History, New York**

Soundbites (English)

*Gaia is probably one of humanity's greatest missions. One of the greatest catalogues of data that has currently existed for humans to go through and it's almost impossible to give you all of the ways in which Gaia is impacting astrophysics.*

*I could never have dreamed that we could pull away from our position on the Earth and actually see the structure of these kinds of associations. And then you can run time forward and see exactly how they're moving. You can see the Orion star forming region. You see the Vela star forming region. You see that the Scorpion association and how it moves. You can compare and contrast how they're all moving differently. And I think it's a story of vast proportions in our understanding of how stars form and evolve.*

*Yes this is the catalog is not just for astronomers. This is extremely important for everybody to take away. This catalog is humanity's catalog. Dig in. Dive in. Enjoy it. This is a map. This is a map of your galaxy that you live in. We can all participate in this and Gaia is readily available for you to go on to the ESA portal and have a look at the data. And as astronomers, I think, every astronomer is sending out a welcome invitation to the youngest of us that are very excited inspired by astronomy and want to know just a little bit more, to the oldest of us that want to know exactly what we do know at this point in the universe. It's for anyone, it's for everyone, and consider it an open invitation to participate in what is, I would categorize, humanity's greatest catalogue of stellar distances, stellar motions.*

**10:08:50**

**Amina Helmi**

**Astrophysicist, University of Groningen, Netherlands**

Soundbite (English)

*So most of the stars in the Milky Way rotate like the sun they go around in a clockwise sense. And so for example we discovered last year a very large group of stars that are going the other way round. And so that's already very suspicious. And it tells you kind of that the stars were formed elsewhere. Being such a large group and it was a very old star. So that was already the first hint that actually one component of the galaxy is probably made up from stars born somewhere else. [30”]*

**10:09:36**

**Amina Helmi**

**Astrophysicist, University of Groningen, Netherlands**

Soundbites in Dutch

**10:11:10**

**Amina Helmi**

**Astrophysicist, University of Groningen, Netherlands**

Soundbites in Spanish

**10:13:00**

**Amina Helmi set-up shots, showing the visualisation on her laptop**

**10:14:55**

**University of Groningen observatory set-up shots**

**10:15:56**

**Gaia animations**

**10:17:52**

**Visualisation showing stars moving in clusters (Jackie Faherty)**

**10:22:11**

**Visualisation showing a galaxy merging with the Milky Way 10 billion years ago (Amina Helmi/University of Groningen)**