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A moment of weightlessness: 3D virtual visit to the parabolic flight aircraft A300 ZERO-G

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This panoramic view of the Airbus A300 ZERO-G captures a moment of weightlessness inside a parabolic flight. You can scroll across the image horizontally and vertically by holding down the mouse button or by using the arrow keys. The test equipment is secured to the aircraft cabin. A number of researchers are using floor-mounted lashings to prevent themselves from floating away from the equipment. It is possible to zoom in and out of this view by using the plus and minus button underneath the image, or by using the scroll wheel on your mouse. The second switch from the right opens a full screen image.



A moment of weightlessness: 3D virtual visit to the parabolic flight aircraft A300 ZERO-G (Credit: Manuel Pédoussaut, Zetapress.)

Weightlessness - essential for many scientific experiments

Everything on Earth is subject to gravity. The only way of avoiding the effect of Earth's gravity is to be in freefall. For example, when diving into a swimming pool from a 5-metre board, one has a sense of weightlessness. When a ball is thrown into the air and goes into freefall, it is weightless during that freefall; it actually follows a parabolic arc. When an aircraft follows the trajectory of a parabolic arc, it also experiences weightlessness. With the Airbus A300 ZERO-G, the pilot can fly a large enough parabola to create conditions of weightlessness for up to 22 seconds on board.

Scientists use these conditions to investigate the effects of weightlessness and various accelerations, or to analyse processes that function best in the absence of gravity. They carry out biological, physical, material science-based and technological experiments. Moreover, for medical research, and with the exception of the International Space Station, parabolic flights in this aircraft are the only way of studying the effects of weightlessness on humans. Every year, the German Aerospace Center (DLR) runs one or two research campaigns, each one involving three days of flying and 30 parabolic manoeuvres on each of those days.

In the background, at various stages of the parabolic flight manoeuvre, the captain announces: "Trois, deux," still three, then two seconds until the aircraft starts to climb steeply. "Thirty," the aircraft has now reached a 30-degree angle of ascent. "Quarante," now 40 degrees, and at 47 degrees, the same voice says "Injection" – announcing the start of the weightlessness phase. Twenty-two seconds later, "pull-out" marks the moment when the nose of the aircraft drops 42 degrees and gravity is restored – albeit at almost twice its usual strength. Then the aircraft flies at the same level for two minutes, until the next parabola commences.

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