

## The D-2 Mission - 10 Days between Heaven and Earth

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### ABSTRACT

7½ years after the first German mission D1 had demonstrated space weightlessness as a unique environment for virtually any scientific field, the second German Spacelab mission, D-2, started on April 26, 1993, with Space Shuttle Columbia for a 10 day flight into space. With 62 experiments from Germany, 21 from other European nations, 2 from USA, and 4 from Japan, D-2 actually was an international mission covering all scientific topics: Material Science (37), Biology (18), Human Physiology (24), Technology (2), Earth Observation (2), Astronomy (1), Amateur Radio (1), Experimental Subsatellites (4). After 160 earth orbits at an orbital height of 300 km and after 6.7 million flight kilometers D-2 mission ended on May 6, 1993.

Training for D-2 started in early 1989 with two years of basic training, which included introductions into all µg-related scientific areas, space courses, but also scuba diving and parabola flights as means to familiarize with the µg-environment, and extensive flight training as the best way to get acquainted with multiple stress conditions. In early 1990 mission specific training took over with four German astronauts involved. It entailed extensive introductions into all D-2 experiments, work shops, manual training of the flight experiments, training of off-nominal situations, and mission simulations (both stand-alone and joint-integrated simulations with NASA). Eight months prior to launch mission training was diverted to NASA at Houston, where Shuttle training was the major issue. This essentially included Shuttle familiarization and emergency egress training for any foreseeable shuttle failure in mission sequence. But also everyday living with the Shuttle, which is not that trivial as it might look like, was on the training schedule.

The talk will give a short overview on the mission science by focusing on two experiments: The verification of Einstein's twin paradox, giving final prove for its astounding correctness and its striking implications on the authors life. And second, a medical experiment on the giant fluid shift in the bodies tissue as exposed to weightlessness which sheds light on similar related effects of patients hospitalized for weeks in supine position. A mission video will witnesses not only the scientific ambition of the mission, but also dwells on the human aspects of such a space endeavour. Based on a few slides, additional attention is paid to the fact that space is a very unusual but unique place to seize our spaceship called earth from a different point of view.