

Research Opportunities on board Virgin Galactic's SpaceShipTwo

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Abstract

Virgin Galactic is building the world's first commercial spaceline. Our suborbital spaceflight system, pictured in Figure 1, consists of two vehicles: WhiteKnightTwo (WK2) and SpaceShipTwo (SS2). WhiteKnightTwo is a four-engine, dual-fuselage jet aircraft capable of high-altitude heavy lift missions, including, but not limited to fulfilling its role as a mothership for SpaceShipTwo, an air-launched, suborbital spaceplane capable of routinely reaching an apogee up to 110 kilometers. In conjunction, these two vehicles allow access to space and to regions of the atmosphere ranging from the troposphere to the thermosphere; additionally, they provide extended periods of microgravity in a reliable and affordable way.



Figure 1. Virgin Galactic's Spaceflight System: WhiteKnightTwo and SpaceShipTwo

SpaceShipTwo, with a payload capacity of up to 1,300 lbs. (~600 kg), features payload mounting interfaces that are compatible with standard architectures such as NASA Space Shuttle Middeck Lockers, Cargo Transfer Bags, and server racks, in addition to custom structures. With the standard interface, payloads are allowed access to the large 17

inch diameter cabin windows for external observations.

Each dedicated research flight will be accompanied by a Virgin Galactic Flight Test Engineer, providing an opportunity for limited in-flight interaction. In addition, tended payloads – a flight that includes the researcher and his or her payload – are also an option. At a price point that is highly competitive with parabolic aircraft and sounding rockets and significantly cheaper than orbital flights, SpaceShipTwo is a unique platform that can provide frequent and repeatable research opportunities.

Suborbital flights on SpaceShipTwo offer researchers several minutes of microgravity time and views of the external environment in the upper atmosphere and in outer space. In addition to serving as an important research platform in and of itself, SpaceShipTwo also offers researchers a means to test, iterate, and calibrate experiments designed for orbital platforms, including the International Space Station as well as LauncherOne, Virgin Galactic's dedicated launch vehicle for small (~500 lbs. / ~225 kg) satellites.

Flights on SpaceShipTwo can be booked directly through Virgin Galactic. Various funding sources may be available for the research, including through NASA programs such as the Flight Opportunities Program, Game Changing Development Program, or Research Opportunities in Space and Earth Science (ROSES). More information about the SpaceShipTwo research platform, including a detailed Payload User's Guide, can be found at our website: <http://www.virgingalactic.com/research>.