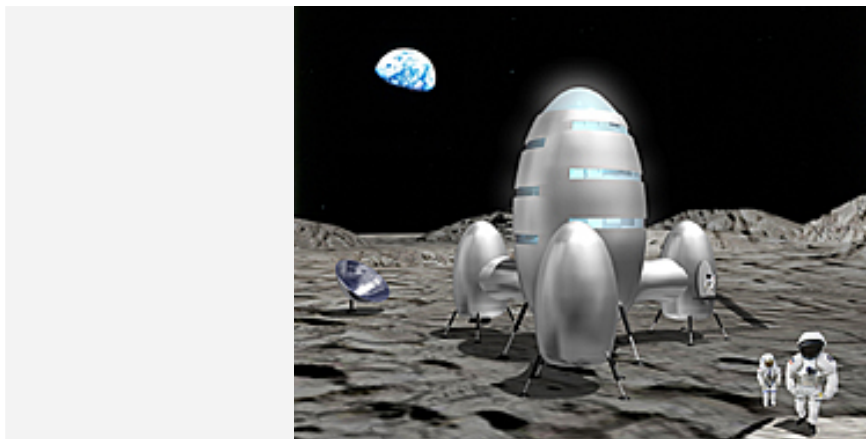

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Building for living the Moon – Lunar Base Symposium in Kaiserslautern

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Vision for a station on the Moon

Scientists from various disciplines share their visions for a Moon base

At the Lunar Base Symposium held on 12 and 13 May 2009 in Kaiserslautern, Germany, scientists and engineers from space-travel related disciplines as well as civil engineers, process engineers and architects discussed how a permanent and habitable base on the Moon might look. The organisers of the symposium were the Technical University of Kaiserslautern (Technische Universität Kaiserslautern) and the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). Around 40 years after the first time and 37 years after the last time astronauts landed on the Moon, this satellite of Earth has once again entered the spotlight of space research. The large space-faring nations are planning a manned return to the Moon and the construction of Moon bases.

Planets, comets and asteroids in our Solar System are currently being explored by various unmanned missions. Astronauts could follow these probes and robots, for example to our neighbouring planet, Mars. The starting point for these missions into space is to be the Moon. NASA is currently planning to return to the Moon with astronauts. Professor Dr Johann-Dietrich Wörner, Chairman of the Executive Board of the DLR, says about the importance of the Moon to space travel: "The Moon is, in the truest sense of the word, a nearby destination on which we can test how we as humans can expand our sphere in space beyond Earth and Earth's orbit. If astronauts are expected to return to the Moon and stay there for a longer period of time, the question at once arises of how a base on the Moon might look and by what means its construction could be realised technically."



Exchange of ideas between a range of scientific disciplines

Exchange of ideas for innovations on Earth

Complete solutions were not expected at the Lunar Base Symposium. Rather, the aim was to facilitate a professional and creative exchange between different scientific fields. Professor Wörner makes the assumption that: "Similar to what happened with the Apollo programme, a Moon base or a manned flight to Mars would lead to a huge wave of innovation on Earth. The exchange of ideas concerning building on the Moon is already providing impetus for innovations, for example in the area of materials research and folding lightweight structures."

Moon exploration: Knowing the most favourable location

If astronauts are to build a base station to accommodate humans on the Moon, they must know which location is the most favourable. One focus of the symposium was therefore the exploration of the Moon. A precondition for future landings on the Moon is having more exact information about the topography and the geology of the Moon. Only in this way can Moon researchers determine the location that provides the maximum level of safety for the astronauts and at the same time shows potential for the investigation of the Moon. In addition, the Moon researchers will explore the surface of the Moon with regard to existing resources and building materials so that the station is constructed as efficiently and durably as possible.



Missions to explore the Moon's surface

Missions to the Moon

Recently, China, India and Japan have sent exploratory satellites to the Moon. The USA's Lunar Reconnaissance Orbiter will be launched this year. Unmanned landing missions are being planned for the near future by the countries mentioned above and also by Great Britain and the European Space Agency (ESA). These missions will explore the Moon, including in their tasks the gathering of data needed for the selection of a place for astronauts to stay on the Moon. An accurate topographical map of the Moon is required and its internal structure must be studied as well. The big question about the formation of the Moon and its early development is still interesting from a scientific point of view. In addition, the Moon's surface is a unique archive of the early development of the Solar System. This is a motivator for the current exploration missions of the space-faring nations of Japan, India, China and the USA.

Survival in a hostile environment



View of the Earth across the surface of the Moon

Another challenge when building a base on the Moon will be the creation and maintenance of a living space for the astronauts in the hostile environment there. The astronauts must, for example, be shielded from high-energy radiation arriving from space – from which we are protected on Earth by the Earth's magnetic field. The researchers also have their eye on the extremely fine and powdery moon dust that was found on the spacesuits of the Apollo astronauts. Aerospace doctors see a potential danger in the moon dust entering the lungs of the astronauts and leading to health problems. All of these conditions on the Moon's surface, many of which still have to be researched in detail, have an impact on the way that a Moon base will be built. A first step for a task that is as complex as building a Moon base is thus bringing together scientists and engineers from different disciplines, who are able to throw light on the topic from different angles and identify further research needs.

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