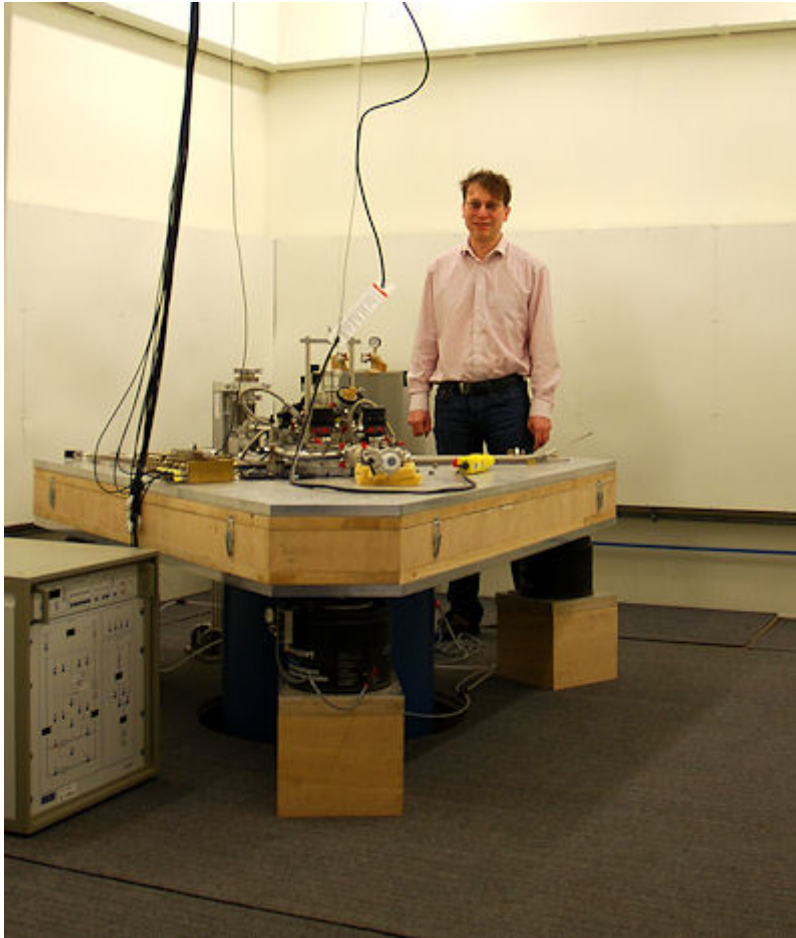


## Project Profile

<b>Project Description:</b>	<b>Ultra-Low Vibration Research Laboratories</b>
Location:	School of Physics & Astronomy
Client:	University of St Andrews
Project Value:	£2.5m
Project Duration:	September 2012 – June 2015
Sector:	Education



*Dr Peter Wahl in one of the four research cells*

Callidus Design was appointed by the University of St Andrews to carry out the design of all services related to the construction of new Ultra-Low Vibration Laboratories at the School of Physics & Astronomy in the North Haugh campus, St Andrews. The laboratories are required to shield the research equipment from noise and vibration present in the external environment.

The use of special tunnelling microscope techniques allows the viewing of individual atoms in a surface, and the densities of electrons around them. This is carried out in a very high vacuum, at very low temperatures, and in very strong magnetic fields. Gaining a better understanding of the way that electrons move together in certain materials may have major impacts on our ability to design and use superconducting materials.

In order to be able to view individual atoms, the environment in which the research is done has to be isolated as far as possible from the vibrations of everyday life. For this reason the research instruments are

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located in a multi-layer concrete box and a "floating floor" is mounted on top of huge "springs" to isolate the equipment from vibrations through the ground from traffic etc. The experiments each hang from a massive "table" which itself is on anti-vibration mounts fixed to the floating floor. The rigs can take samples down to milliKelvin temperatures and can maintain positioning between the sample and the probing point sufficient to be able to "see" individual atoms.

Having considered in detail several other possible locations for the new laboratories on site, the decision was taken to locate the new building to the east of the School of Physics & Astronomy. The building housing the individual laboratory cells was constructed in mass concrete with the minimal number of openings required to enable the building to function. All services were designed to eliminate plant-generated vibration and noise before entering the building. All plant was selected for very low noise and vibration emissions. Where possible, the services were extended from existing infrastructure in the main building but where this was not feasible, new services were created local to the laboratories.

Callidus Design was responsible for the design of the following services provided to the Ultra-Low Vibration Laboratories:

- Fresh Air and Recirculation Ventilation to maintain the required environmental conditions inside the building for the comfort of the occupants and the stability of the research instruments.
- Chilled Water system (serving ceiling mounted cassette units and Passive Chilled Beams)
- LTHW System serving the Air Handling Unit Heating coil and space heating
- Compressed Dry Air System
- Helium Leakage and Oxygen Depletion detection and alarm systems
- Emergency Helium discharge system in the even of a magnet quench event
- Building Management System (BMS)
- Small Power
- Lighting
- Data
- Fire Alarm
- Security
- Lightning Protection