University of Wollongong

Visiting astronaut pays tribute to UOW's critical space medical research

The University of Wollongong's contribution to the safety of future space missions received strong praise from visiting US astronaut Dr Leroy Chiao.

The astronaut (who has also flown with Russian missions and speaks Russian) paid a special visit to UOW to present a public lecture entitled "The Spaceflight Experience and Biomedical Issues for Long Duration Missions".

His visit was hosted by the Director of the Faculty of Engineering's Centre for Medical Radiation Physics (CMRP), Professor Anatoly Rosenfeld.

Dr Chiao was in Wollongong as part of the project which involves CMRP's development of radiation dosimeter instrumentation* for manned space missions.

He outlined to a captivated audience in the Central Lecture Block how human spaceflights were a grand adventure -- but not without their risks. And among the risks were those dealing with space biomedicine.

Dr Chiao said biomedical issues would become more important in the future, as humans venture on longer missions, beyond Low Earth Orbit.

He highlighted that the future of space flights was uncertain in the United States at present but said the planet Mars was certainly high on the agenda as the next place to go.

The CMRP is part of a team that has previously won a prestigious research grant from the US National Space Biomedical Research Institute - NASA.

The research work involves the development of space qualified instrumentation for assessment of radiobiological effects on humans during long-term space missions.

"Space radiations have significantly affected NASA flight missions," according to Professor Rosenfeld.

"Radiations adversely influence the design, reliability, payload mass, mission duration and planned operations of both robotic and human mission. Damage has included reduced power generation, failure of microelectronic devices, and increased background noise in sensors."

Professor Rosenfeld said that the effects of space radiations on humans can also be extremely harmful.

"In humans, radiation exposure may lead to somatic and genetic effects. Acute health complications at relatively high doses could include fatigue, erythema, loss of hair or vomiting," he said.

"Long-term complications from low doses at protracted exposures might include carcinogenesis, central nervous system damage and other diseases," Professor Rosenfeld said.

The future well-being of NASA space missions may well rest with an innovative instrument using microdosimetry technology devised in Wollongong that has already been launched into space for testing.

The Micro Dosimeter Instrument devised by Professor Rosenfeld can measure a range of radiobiological effects – including effects on humans during long-term space missions.

Dr Chiao said the work done through the CMRP would go a long way to help combating one of the biggest threats faced by astronauts and cosmonauts – cosmic radiation.

The visiting astronaut has extensive experience as a NASA astronaut and before that, as a research engineer. He is involved in entrepreneurial business ventures and works in the US, China, Japan and Russia.

Dr Chiao most recently served as Commander and NASA Science Officer of Expedition 10 aboard the International Space Station. He has logged over 229 days in space – more than 36 hours of which were spent in Extra-Vehicular Activity (EVA, or spacewalks). From June–September 2009, he served as a member of the White House appointed Review of US Human Spaceflight Plans Committee, and currently serves on the NASA Advisory Council.

The US astronaut was quick to debunk one myth that involves space travel – that the Great Wall of China can easily be seen from outer space. Not true, he says, as he has taken thousands of close-up photos of Earth from space using a high millimetre lens camera.

“But the Great Barrier Reef from up in space looks great,” he added.

And the scariest moment he has had in space – when one of his spacecrafts came within metres of hitting the space station which would have ended in catastrophe for all on board.

[*Microdosimetry is based on measurements of energy deposited by radiation at cellular level and able to measure radiobiological properties of radiation fields (equivalent radiation dose) independently on the type and energy of charged particles or neutrons.]

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