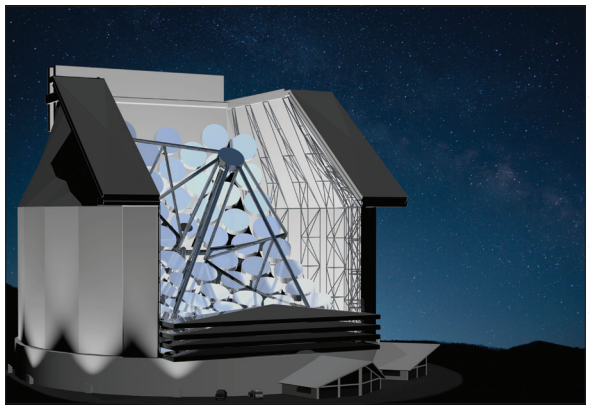
Astronomy

Colossus telescope to seek out exoplanet 'footprints'

A group of entrepreneurs and astronomers are planning to construct a huge ground-based optical telescope that would dwarf even the biggest planned facility. The 74 m Colossus telescope would, if built, be the largest in the world with a diameter almost double that of its closest competitor – the 39.4 m European Extremely Large Telescope (E-ELT), which is expected to be complete in 2020. The Colossus is still in the early planning and design phase, with the consortium behind it reticent to reveal too many details at this stage. However, such giant telescopes do not come cheap, with the E-ELT expected to cost around €1bn.

The Colossus is the brainchild of former mining executive Caisey Harlingten, Jeff Kuhn of the University of Hawaii, David Halliday of Dynamic Structures and astronomer Svetlana Berdyugina from the Kiepenheuer-Institut für Sonnenphysik in Freiberg, Germany. The consortium also includes astronomers in France, Germany, Japan, Mexico and the US. As building a single 74 m mirror would be impractical, Colossus will instead use 60 mirrors each 8 m in diameter to form a much larger combined aperture in one single telescope. "Our group is experienced and focused and includes academic and industry partners that have already been responsible for some of the world's largest telescopes," lead scientist Kuhn told *Physics World*.



Colossus Consortium/Dynamic Structures Ltd

Bigger and better
The 74 m Colossus telescope, if built, would use 60 mirrors each 8 m in diameter to study the atmospheres of exoplanets.

According to Kuhn, Colossus's success will depend on finding ways to measure, control and then phase each of the 60 mirrors, to manufacture them economically, and to build a wind-protective support structure for a telescope of this immense size. "Optical phase control of these 60 elements allows for both very high angular resolution and the ability to see very faint sources near bright central core objects," adds Kuhn.

Colossus is designed to seek out evidence for extraterrestrial civilizations by studying exoplanets very close to their stars. This will include determining their atmospheres and surfaces as well as measuring their potential for life – be it primitive life via atmospheric biomarkers, or what Kuhn calls the "thermal footprints" of Earth-like extraterrestrial civilizations. "We have a diverse team that draws broad input from astronomers with technical expertise in exoplanetary science, to NASA centre directors," adds Kuhn. The Colossus will have a narrow five arcsecond field of view – a tiny sample of sky compared with the E-ELT's planned 10 arcminute field of view. This will allow it to study the spectra of an exoplanet's atmosphere to an unprecedented resolution.

The Colossus consortium is now planning to complete the design and prototype phase, which will test some of the new mirror technologies. The Colossus telescope could be ready within five years, according to Kuhn. "Private locations at low latitudes are being explored for deploying the first Colossus," he says. Kuhn adds that anyone interested in buying their own Colossus should contact the consortium for "price and availability".

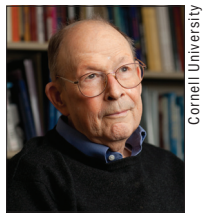
Gemma Lavender

People

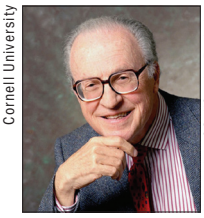
Bubble chamber and superfluidity laureates die

The US physicists and Nobel laureates Robert Richardson and Donald Glaser have died at the ages of 75 and 86, respectively. Richardson, a condensed-matter physicist, co-discovered superfluidity in helium-3, while Glaser was instrumental in inventing the bubble chamber – a vessel filled with a superheated transparent liquid such as liquid hydrogen that can be used to detect electrically charged particles moving through it.

Richardson was born on 26 June 1937 in Washington, DC and did BSc and MSc degrees at the Virginia Polytechnic Institute. He received a PhD in physics in 1966 from Duke University, where he worked under Horst Meyer on nuclear magnetic resonance of solid helium-3. In 1966 Richardson moved to Cornell, where he spent the rest of his career focusing on low-temperature physics. For finding helium-3 superfluidity, Richardson shared the Nobel Prize for Physics in 1996 with his former PhD student Douglas Osheroff and David Lee. Richardson also served as Cornell's first vice-provost for research from 1998 to 2003



Cornell University



University of California, Berkeley

Nobel pioneers
Robert Richardson (left) and Donald Glaser.

Glaser was born in Cleveland, Ohio, on 21 September 1926. He received a BSc in physics and mathematics in 1946 from the Case Institute of Technology in Cleveland, completing his PhD in 1949 at Case on the energy spectrum of high-energy cosmic rays and mesons.

Glaser then moved to the University of Michigan where he built a number of diffusion cloud chambers and invented the bubble chamber. He won the Nobel Prize for Physics for this work in 1960, aged just 34. Work with the bubble chambers gave information on the lifetimes and decay modes of particles such as the K^0 meson and, more recently, led to the discovery of weak neutral currents – one way in which particles can interact through the weak force and paved the way for the discovery of the W and Z bosons.

In 1959 Glaser went to the University of California, Berkeley and began to work in the relatively new field of molecular biology. In 1971 he co-founded Cetus Corporation – one of the very first biotechnology companies – to use the increasing knowledge of DNA to solve problems in agriculture and medicine.

Michael Banks and Hamish Johnston