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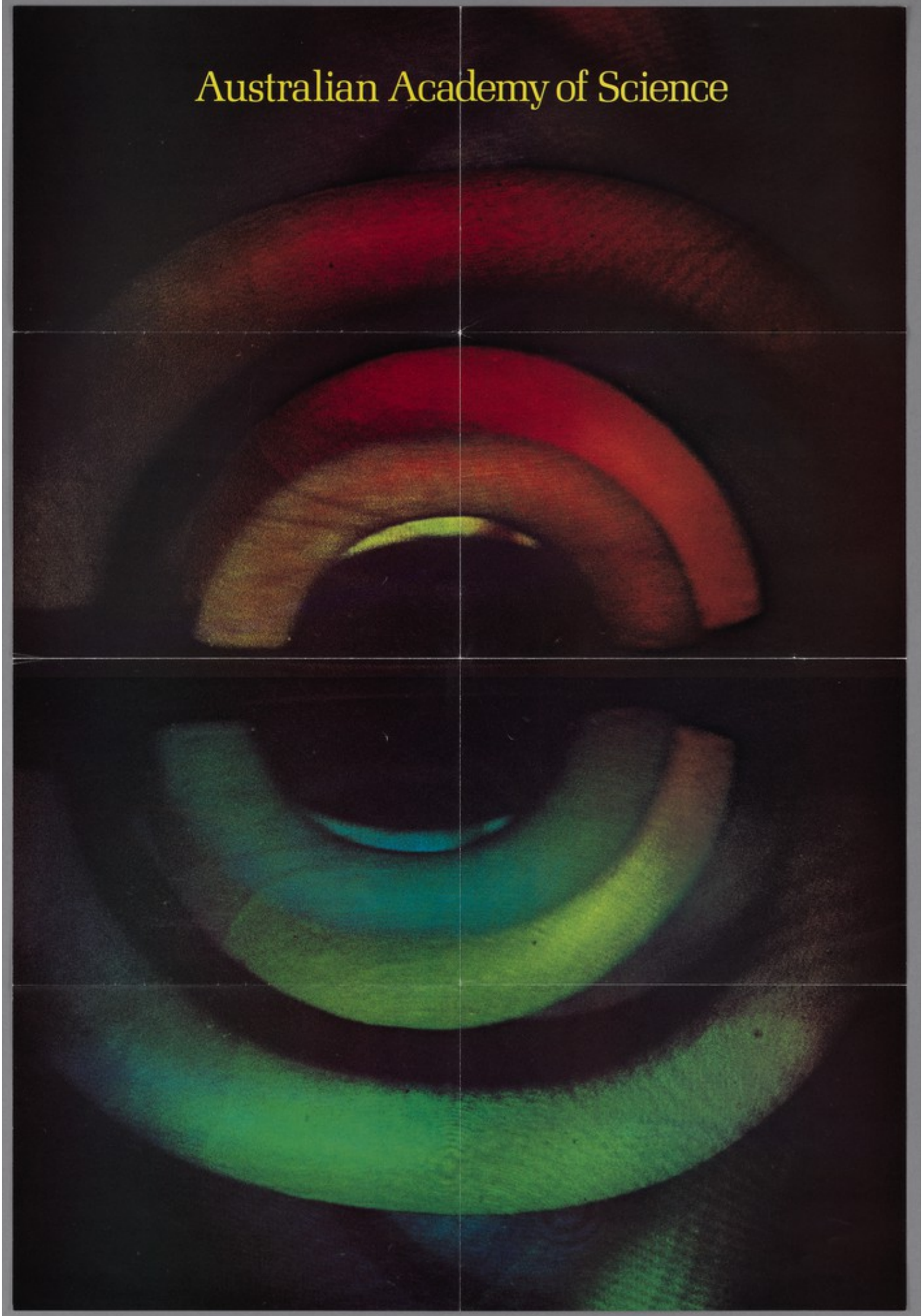
Australian Academy of Science



Australian Academy of Science

The Australian Academy of Science has as its aim to spread scientific knowledge, to establish and to maintain scientific standards in Australia, and to recognise outstanding personal contributions to the advancement of science. The Academy, which celebrates its Silver Jubilee in 1979, was set up under Royal Charter by Queen Elizabeth.

Few issues in science in Australia arise without a contribution from the Academy as the only Australian body able to speak for natural science as a whole. While members of the Academy are few, its work touches many segments of Australian society.

Its members, 192 Fellows, are elected for their pre-eminence in science, and include many of those involved in the most exciting scientific developments in Australia. They come from universities, research institutes, industry and the CSIRO.

By its scientific reports on such topics as Supersonic Transport, Use of DDT, Diet and Coronary Heart Disease, Food Additives, Climatic Change, Offshore Resources, Transport, and Effects of Noise, it provides independent information of a high quality to government and the community on problems raised by technology and present-day developments in society. Studies on harnessing solar energy and the feasibility of using icebergs towed from Antarctica to provide fresh water for dry parts of Australia are aimed at contributing to the future development of Australia.

Leaders of science, industry, government and other parts of the community join in the Academy's Science & Industry Forum to explore ways in which science and industry can benefit the nation's development. Hundreds of scientists give their services freely to help achieve the aims of the Academy by contributing to its scientific enquiries, working groups, and in the preparation of its many publications.

Many other scientists have participated in the scientific conferences organised in Australia by the Academy in the past twenty years. School teachers and school children know the Academy for its senior secondary course "Biological Science: The Web of Life", developed and published by the Academy. This is now a standard text which has revolutionised the teaching of biology in all states of Australia.

The Academy is a focal point in Australia for international activity in science. The International Geophysical Year, which, in 1957, saw the launching of the first satellites and the crossing of Antarctica, is one example. The more recent International Biological Programme and the present Global Weather Experiment, a major international collaborative scientific enterprise, which started in December 1978 and which will provide vastly improved understanding of weather systems, follow in the same pattern.

The exchange of visiting groups of scientists from China and Australia, and the start of similar exchange visits with Japan, are among the Academy's other contributions to Australia's role in international science.

The Academy, an independent organisation, receives finances from its own efforts, from private sources, and from Government.

Rainbow Hologram

The most striking aspect of the subject of this poster cannot be shown, and that is its three-dimensionality. Put very simply, a hologram is a three-dimensional photograph, but unlike other methods of recording three-dimensional images, which show only one angle of view, the holographic image is seen as though a real object were present. On first seeing a hologram most people react with astonishment, delight and sometimes disbelief. They look round and behind the images of the objects, and are curious to know how such an image can be made.

A basic explanation is that a hologram allows the re-creation of the light wave-fronts originally coming from the object. This gives the illusion that the whole solid object is there. Holograms can only be recorded by lasers. The unique property of laser light which makes it suitable for holography is its "coherence". This means that the light beam is composed solely of waves of identical length which are in phase or "in step". The regular nature of the beam allows a pattern to be recorded on the holographic plate which gives spatial information about the object. Although a laser is necessary to record a hologram, other light sources can be used to view them. The image on this hologram can be seen with an ordinary tungsten floodlight.

The theory of holography was discovered in 1948 by Dennis Gabor, who won the Nobel Prize in Physics for his invention 23 years later. With the advent of the laser, modern holography was launched and Emmett Leith and Uris Upatnieks produced the first laser transmission holograms in 1963. With holography into its second decade, innovations continue. The "rainbow" hologram was invented by Stephen Benton in 1969. This type of hologram gives a very bright image, which can be viewed with a white-light source, and which appears in a succession of spectral lines if the viewer moves up and down when looking at the hologram. A further breakthrough into multi-colour "rainbow" holography was made by Dr Barthakur, Dr Steele and Soltan Hegedus at CSIRO National Measurement Laboratory, Sydney, in 1977.

Five years after the first laser transmission hologram was achieved, Margaret Benyon was one of the first artists, if not the first, to make holograms. She believes that in working with a medium from the beginning of its development it should be possible to influence the direction of its use. This multi-coloured hologram of a model of a solid rainbow was the outcome of collaboration between Margaret Benyon and Soltan Hegedus of CSIRO, and was made while the former held a Creative Arts Fellowship at the Australian National University, Canberra, in August 1978.

Photograph: Margaret Benyon, ANU Creative Arts Fellow.
Text: Margaret Benyon.

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