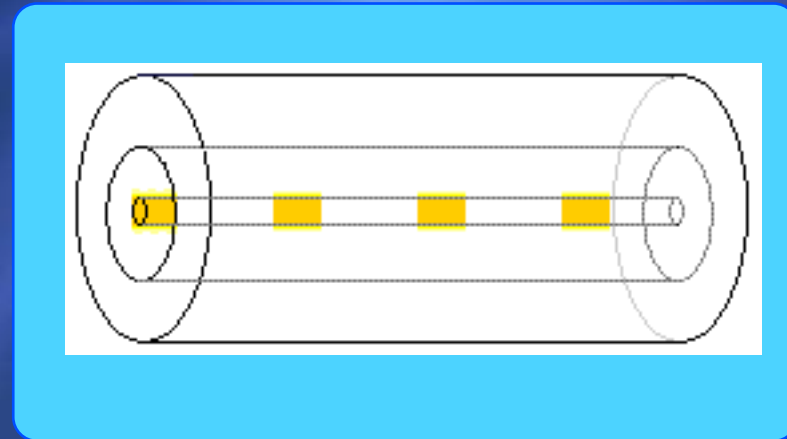
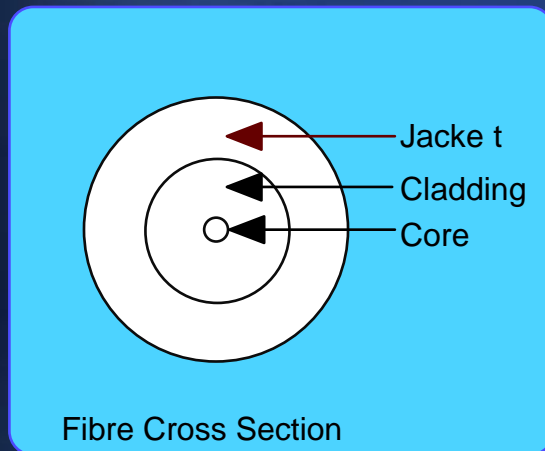


Optical Communications Research in New Zealand

J.D.Harvey
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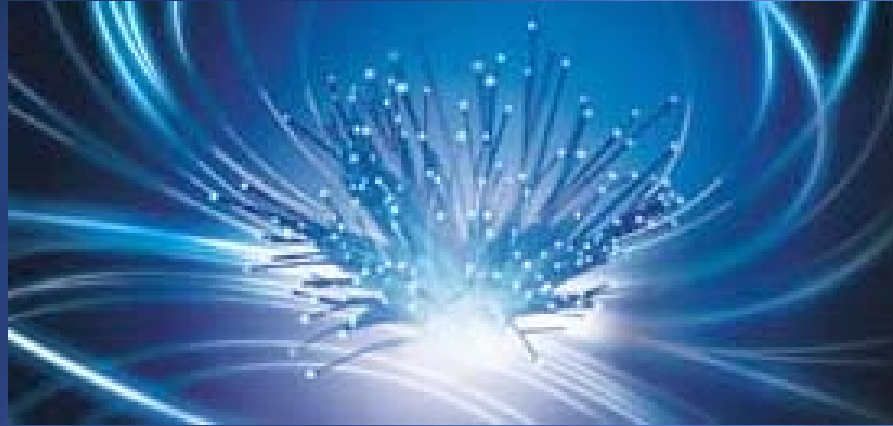
The Internet

- ⊕ The existence of the World Wide Web is a consequence of the development of the Optical Fibre.



- ⊕ Optical Fibre Communications systems have transformed the world, but many people are unaware of the crucial role of photonics .
- ⊕ Telecommuting, e-mail, online commerce and “the global village” are a consequence of optical communications technologies.

Optical Fibre Research



- ⌘ Optical fibre research in New Zealand has been performed for over 20 years.
- ⌘ New Zealand research teams collaborate with research groups in Australia, USA, the UK, France and Germany.
- ⌘ Progress and key research successes in optical communications have led to the development of a startup company selling test and measurement equipment worldwide.

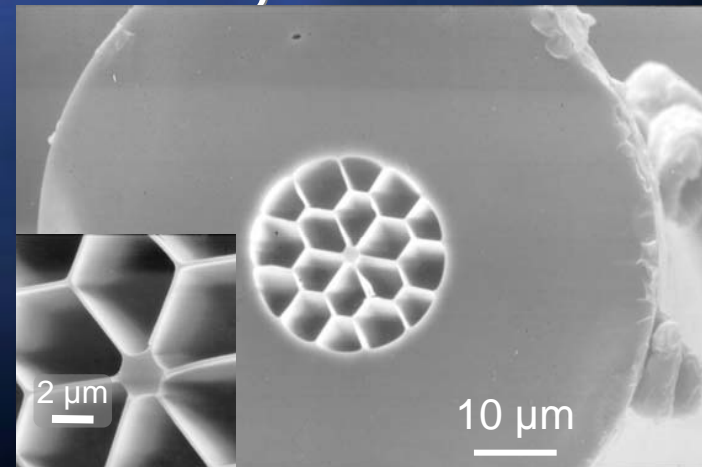
Photonics Training in NZ

- ⊕ The size of the research group in Auckland has led to the development of New Zealand's only undergraduate degree in Photonics.
- ⊕ This degree programme with the associated graduate training and research attracts students from around the world.

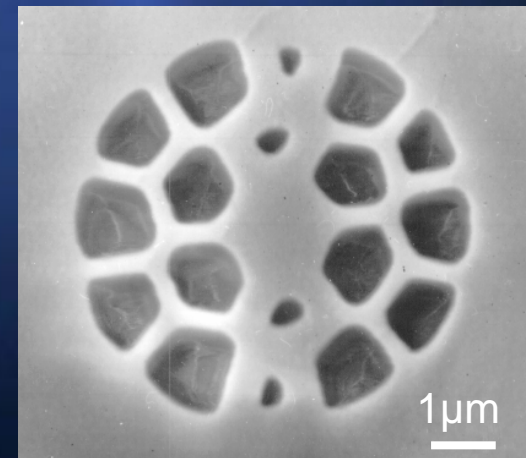
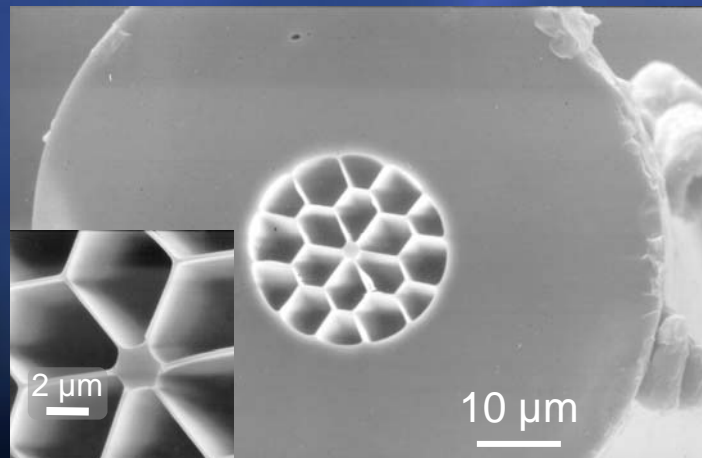
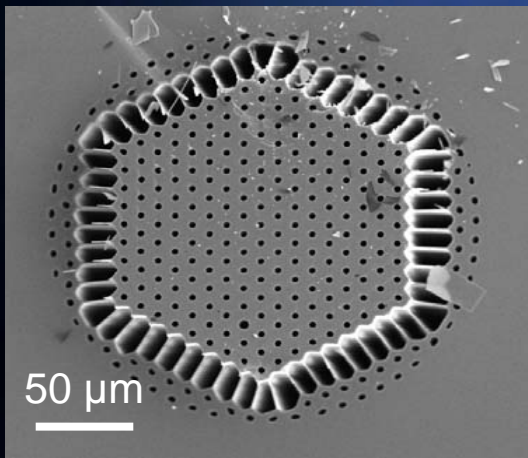
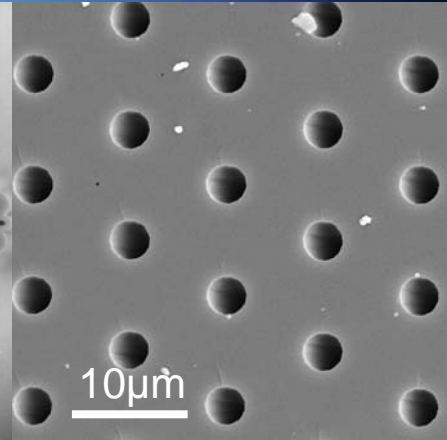
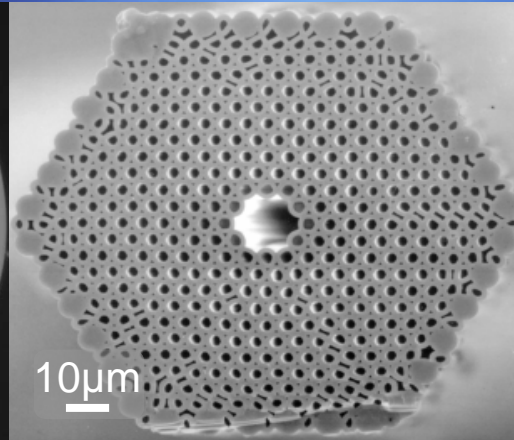
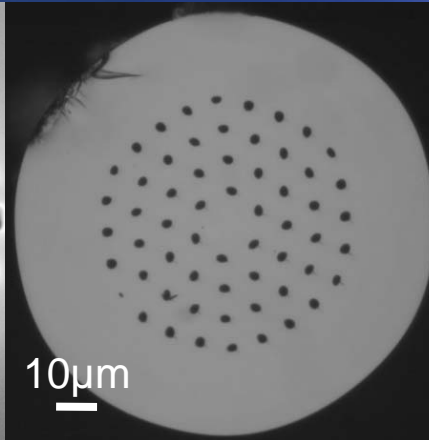
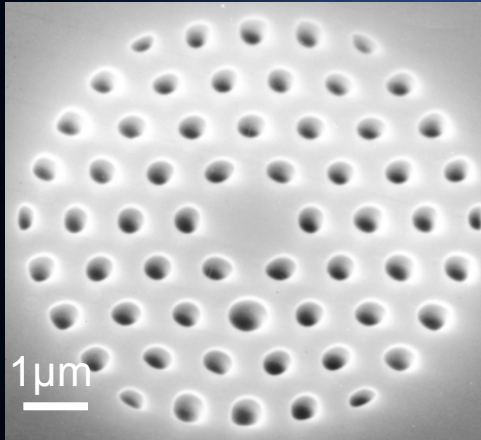


Research Collaborations

- ⊕ The group has ongoing collaborations and close linkage with several international groups including:
 - ⊕ CUDOS (Centre for Ultrahigh Bandwidth Devices in Optical Systems) in Sydney (Australia)
 - ⊕ The ORC (Optoelectronics Research Centre) in Southampton (UK)
 - ⊕ Photonic Crystal Fibre group at Bath University (UK)
 - ⊕ Lucent (Bell Labs) in USA

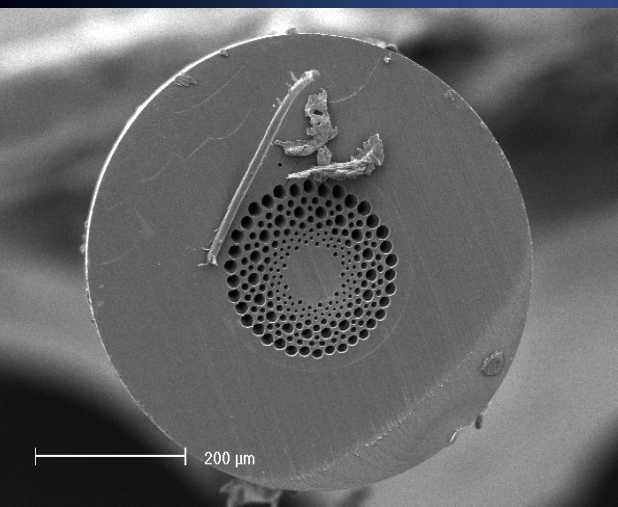


Other Specialist Optical Fibres

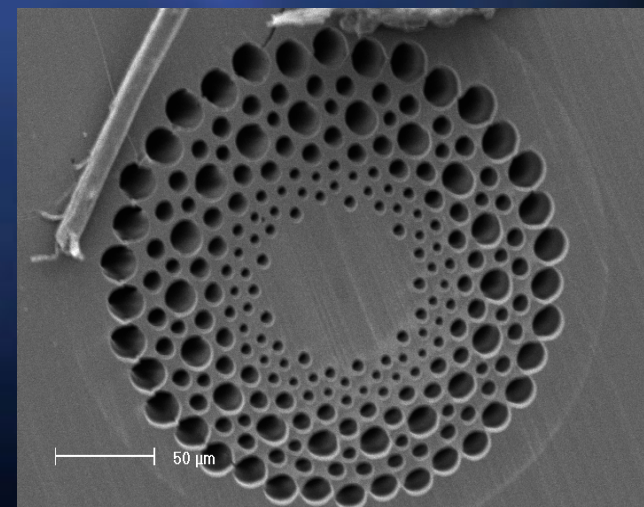


New Zealand Research

- ⊕ Optical communications research is centred at Auckland University.
 - ⊕ Optical pulse compression and conditioning
 - ⊕ Optical switching (mechanical and optical)
 - ⊕ Optical pulse amplification and analysis
 - ⊕ Wavelength conversion (for WDM systems)
 - ⊕ Plastic Fibre applications (including FTTH)



*Graded Index
Microstructure Plastic
Optical Fibre (GIMPOF)-
developed in Australia,
cleaving technology
developed in NZ*



Related Research Groups

- ⊕ Optical communications research is also performed at the University of Otago
- ⊕ Wireless communications research is the focus of groups within:
 - ⊕ The Engineering Schools at the Universities of Canterbury and Auckland
 - ⊕ Industrial Research Ltd (IRL-a government research institute)

Wireless Communications Research at IRL

⊕ OFDM

- ⊕ detection and synchronization
- ⊕ implementation of baseband processor

⊕ MIMO / Smart Antenna

- ⊕ SVD-based capacity enhancement
- ⊕ implementation of baseband processor

⊕ Cognitive Radio

- ⊕ interference detection
- ⊕ interference tolerance

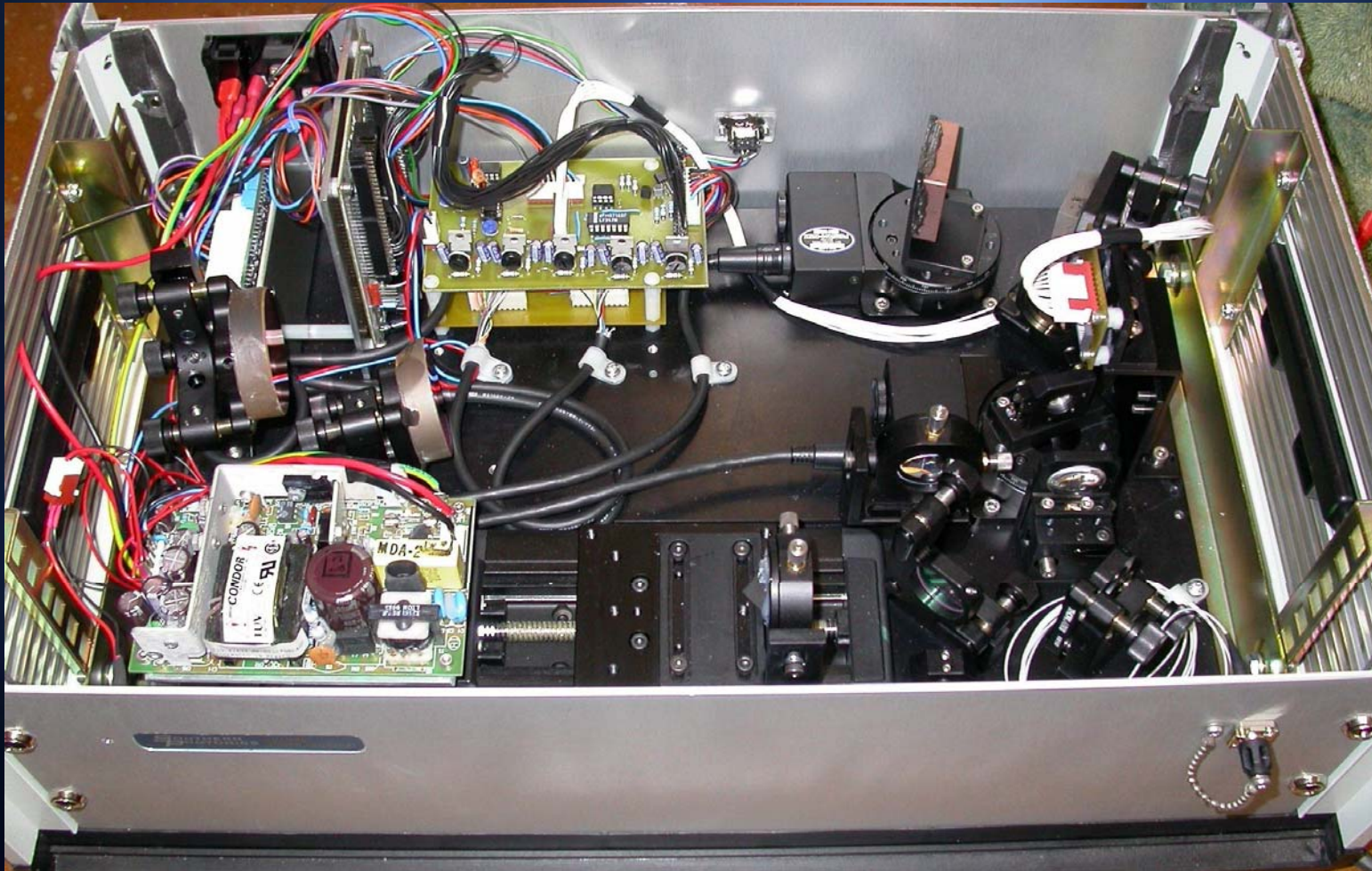
Local Industry

- ⊕ Photonics has been identified in many developed countries as a major growth area.
- ⊕ The Auckland group provides consulting support and trains graduate students for a range of local companies including:
 - ⊕ Endace (Data monitoring systems)
 - ⊕ Fisher and Paykel Healthcare (Medical equipment)
 - ⊕ Tait Electronics (Wireless systems)
 - ⊕ Navman (Maritime instrumentation)
 - ⊕ Rakon (GPS crystals)
 - ⊕ Allied Telesyn (Router manufacturer)

Southern Photonics

- ⊕ Formed in 2001 as a spinoff company from the University of Auckland.
- ⊕ The company:-
 - ⊕ Remains closely integrated with the University campus.
 - ⊕ Manufactures Test and Measurement equipment for high speed optical communications systems.
 - ⊕ Develops new products via cutting edge research in nonlinear fibre optics and ultrahighspeed optical data streams.
 - ⊕ Recently signed a licensing agreement with Bell Labs (USA).

Southern Photonics



Southern Photonics

- ⊕ Southern Photonics is one of a number of companies spun out of the University system in New Zealand.
- ⊕ There is significant government support for this model of economic growth through the development of new industries
- ⊕ The company:
 - ⊕ Performs government funded and commercially driven Research and Development
 - ⊕ Has distributors in USA, Europe, Japan, China and Israel
 - ⊕ Seeks linkages in Korea!

Conclusions

- ⊕ New Zealand has a vigorous research community in high speed communications systems at the physical layer.
- ⊕ The NZ research community is closely linked to major Centres of Excellence in Europe, the USA and Australia.
- ⊕ The market for products from new industries in this area is global and New Zealand needs to continue to expand its collaborations worldwide.