Imperfections and new ideas
Peter Townsend

This will be a very brief summary of my career. Central to this has been an understanding and exploitation of imperfections and impurities in materials. “Imperfections” is an unfortunate choice of word as in fact understanding them has shaped nearly every technology from metals to semiconductors. My own interest has centred on their use in insulators from glass to crystals, optical waveguides and their use for photonics. Plus, excursions into geology, luminescence, dosimetry, improvements in photomultiplier light sensing, cancer detection and music. In hindsight I realise my main strength has been in innovation and ideas that have resulted in a number of totally different new research areas. The concepts were invariably extremely simple and understandable, so it will be possible to describe them rapidly, and in terms that need no prior scientific expertise. I plan to present just one example per decade from my research career. I will strongly emphasise that the successful realisation of my ideas has been totally dependent on collaborations with some extremely able colleagues, skilled technicians, and able postgraduate students. Our combined output is around 550 publications, 8 books, patents and nearly 70 theses.