

PAWSEY MEDAL 1974

The medal commemorates the contribution of Dr J.L. Pawsey, FAA, a pioneer in the field of radio astronomy, to Australian science. It is awarded annually for distinguished research in physics by a scientist under 36 years of age. The 1974 medal was awarded to Donald Blair Melrose for his contributions to plasma astrophysics. Dr Melrose is Reader in Theoretical Physics, School of General Studies, Australian National University. He has received international recognition in this new and rapidly expanding field for his work on radiation processes, and on the scattering and acceleration of fast particles. More recently he has become a recognised expert on the theory of solar radio emissions.

His earlier work on radiation processes included, on the one hand, extension of the theory of the transfer of synchrotron radiation to allow for the effects of the circularly polarized components, and, on the other hand, developments in the theory of Thomson scattering by relativistic particles to incorporate induced scattering, double scattering and the effects of an ambient magnetic field. His more recent work in connection with solar radio bursts includes contributions to the theories of mode coupling and of coherent gyromagnetic emission. Perhaps his most important contributions are to the theory of the so-called 'plasma emission' mechanisms which involve non-linear coupling between plasma waves. The theory of these mechanisms was extended both to incorporate the inverse absorptive mechanisms and to allow for the effects of the ambient magnetic field on the non-linear processes themselves. Most recently he has applied to the solar corona ideas on the scattering and acceleration of fast particles which he had developed previously in other astrophysical contexts.