

### **Russell Varian Prize 2009 Laureate**

Albert W. Overhauser, Stuart Distinguished Professor of Physics, Purdue University, West Lafayette, IN, US.

#### **Awarded contribution**

The talk given by Albert Overhauser at the American Physical Society meeting on May 1, 1953, of which an abstract appeared as

Albert W. Overhauser, Polarization of Nuclei in Metals, Phys. Rev. 91, 476 (1953),

and full detail as

Albert W. Overhauser, Polarization of Nuclei in Metals, Phys. Rev. 92, 411-415 (1953).

#### **Awarded technology**

This contribution is the seed of two important techniques in modern NMR: the Nuclear Overhauser Effect (NOE) and Dynamic Nuclear Polarization (DNP).

NOE describes the mutual influence of the polarizations of two spin species by spin-lattice relaxation. Originally, the spins were those of the nuclei of a metal and those of its conduction electrons. Soon after Overhauser's prediction, the effect was demonstrated by C. P. Slichter on metallic lithium, and was shown by IoneI Solomon to also exist between different nuclei in ordinary liquids. The NOE has played a key role in liquid state NMR over several decades, notably in establishing the overall structure of biological macromolecules in solution

DNP describes the often impressive enhancement of the nuclear polarization by strong irradiation of an electron resonance in the sample. Particularly within recent years, DNP technology has evolved considerably to a powerful sensitivity enhancement method in a growing variety of NMR applications.