Bell Laboratories Scientists Named 1978 Nobel Prize Laureates

Arno A. Penzias, director of the Radio Research Laboratory, and Robert W. Wilson, head of the Radio Physics Research Department, at Bell Laboratories, Holmdel, N.J., have been named co-winners of the 1978 Nobel Prize in Physics, jointly with Professor Pyotr Kapitsa of the Academy of Sciences, Moscow. The Bell Labs scientists are receiving the award for their discovery of cosmic microwave background radiation, and Kapitsa is being cited for his basic work in low-temperature physics.

In 1964, Penzias and Wilson began using the most sensitive radio astronomy antenna available, assembled at Crawford Hill initially for satellite communications studies on Echo and Telstar and subsequently for a project they hoped would improve our understanding of the Milky Way. They concluded that what first appeared to be a faint noise signal was the background radiation (3°K) remaining from a cosmic explosion that gave birth to the universe some 20 billion years ago.

"One of the consequences of [the big bang] theory is that the heat from the explosion . . . should be left over and should be barely detectable," Penzias said.

The significance of the theory confirmed by their discovery, Wilson said, "is that the universe had a definite origin. During the first few minutes, when hydrogen and helium were being formed in the universe, there was a critical time when the ratio of certain elements was set. The present temperature and density of matter in the universe are an indication of what must have gone on billions of years ago."

Following in the tradition of Karl Jansky, the founder of radio astronomy, Wilson, Penzias, and their colleagues have recently introduced millimeter-wave technology to the study of radio astronomy spectra, thus increasing the useful spectrum. An important early consequence of this achievement was the discovery of dozens of chemical compounds in interstellar space.

Continuing Bell Labs pioneering efforts in microwave radio communications and radio astronomy, Penzias and Wilson and other members of the Radio Research Laboratory have been applying astronomical techniques to the measurement of earth-space signal propagation. Using a new millimeter-wave antenna at Crawford Hill, they are gathering more comprehensive data than ever before on the effects of weather on high-frequency signals.

Wilson and Penzias are the sixth and seventh Bell Labs scientists to receive the Nobel Prize in Physics. In 1937, Clinton C. Davisson won the award for discovery of the wave nature of matter. The Nobel Prize was awarded in 1956 to John Bardeen, Walter Brattain, and William Shockley for the transistor. Last year, Philip W. Anderson, consulting director in Physics Research, was awarded the Nobel Prize for his theoretical studies of magnetism and disordered systems.

Robert W. Wilson, left, and Arno A. Penzias, Nobel Prize Laureates