X Encuentro Nacional de Analistas,
Alberto P.Calderón
La Falda, Argentina

SPEAKER: Edward N. Wilson
Department of Mathematics
Washington University in St. Louis
St. Louis, MO
USA

TITLE: IMPORTANCE OF ZAK TRANSFORMS FOR HARMONIC ANALYSIS

ABSTRACT: In engineering and applied mathematics, Zak transforms have been effectively used for over 50 years in various applied settings. As Andre Weil observed in the 1940s and as I. Gelfand noted in a 1950 paper, an exceedingly elementary proof of the Plancherel Theorem for LCA groups uses only the Fourier series ideas later incorporated in Zak transforms; in brief, Zak transforms are Fourier series expressions and the Fourier transform on any non-compact LCA group is an average of Zak transforms. It is remarkable that only a small handful of mathematicians know this proof and that all textbooks continue to give much harder and less transparent proofs for even the case of the group $\mathbb{R}$. Generalized Zak transforms arise naturally as intertwining operators for various representations of Abelian groups and allow formulation of many appealing theorems.