1030-42-236 **Ahmed I Zayed*** (azayed@math.depaul.edu), Department of Mathematical Sciences, 2320 N. Kenmore Ave, Chicago, IL 60614, and **Isaac Pesenson** (pesenson@math.temple.edu).
Paley-Wiener-Type Theorem in a Hilbert Space. Preliminary report.

The Paley-Wiener space $PW_\sigma(\mathbb{R})$ of bandlimited functions consists of entire functions of exponential type, with type $\leq \sigma$, that belong to $L^2(\mathbb{R})$ when restricted to $\mathbb{R}$. The Paley-Wiener theorem for bandlimited functions gives a nice characterization of the space $L^2[-\sigma,\sigma]$ under the Fourier transformation. A function $f \in L^2(\mathbb{R})$ belongs to $PW_\sigma(\mathbb{R})$ if and only if its L^2-Fourier transform $\hat{f}(\omega)$ has support in $[-\sigma,\sigma]$.

Another characterization of the space $L^2[-\sigma,\sigma]$ that avoids complex variable techniques was given by Bang (Proc. Amer. Math. Soc. 1990): Let $1 \leq p \leq \infty$ and $f(x) \in C^\infty(\mathbb{R})$ such that $f^{(n)} \in L^p(\mathbb{R})$ for $n = 0, 1, \cdots$. Then the limit

$$\sigma_f = \lim_{n\to\infty} \left\| f^{(n)} \right\|_p^{1/n}$$

exists and

$$\sigma_f = \sup\left\{ |\omega| : \omega \in \mathrm{supp}\hat{f}(\omega) \right\},$$

where $\hat{f}$ is the Fourier transform of f. Such a characterization is called a Paley-Wiener-type characterization.

In this talk we introduce a Paley-Wiener-type theorem associated with a general self-adjoint operator in a Hilbert space. (Received August 03, 2007)