1082-33-44 **Daniel J. Galiffa*** (djg34@psu.edu), Penn State Erie, The Behrend College, 4205 College Drive, Erie, PA 16563, and **Boon W. Ong** (bwo1@psu.edu), Penn State Erie, The Behrend College, 4205 College Drive, Erie, PA 16563. *Characterizing q-Orthogonal Polynomials via Difference Equations.* Preliminary report.

In this talk, we ultimately show how to obtain all of the q-orthogonal polynomial solutions to the difference equation $\mathcal{D}_q(P_n(x)) = \gamma_n P_{n-1}(x)$, where $\mathcal{D}_q$ is the Askey-Wilson degree-lowering, divided-difference operator defined by

$$\mathcal{D}_q f(x) = \frac{\breve{f}\left(q^{\frac{1}{2}}z\right) - \breve{f}\left(q^{-\frac{1}{2}}z\right)}{\breve{e}\left(q^{\frac{1}{2}}z\right) - \breve{e}\left(q^{-\frac{1}{2}}z\right)},$$

with $z = e^{i\theta}$, $\breve{f}(z) = f(x) = f(\cos\theta)$, for any function f and $e(x) = x$. We begin by discussing the how this equation was developed and its importance in characterizing q-orthogonal polynomials. Next, we show how we obtained its solution(s) via an interesting Chebyshev polynomial expansion technique. From there, we discuss future directions of this work and how other similar difference equations can be developed. (Received June 07, 2012)