**Meeting:** 1001, Evanston, Illinois, SS 22A, Special Session on Special Functions, Orthogonal Polynomials, and their Applications

1001-33-227 **Paul M Terwilliger*** (terwilli@math.wisc.edu), Math Department, University of Wisconsin, 480 Lincoln Drive, Madison, WI 53706. *The compact representation of a Leonard pair.* Preliminary report.

Let $K$ denote a field, and let $V$ denote a vector space over $K$ with finite positive dimension. We consider a pair of linear transformations $A : V \to V$ and $A^* : V \to V$ that satisfy both conditions below: (i)There exists a basis for $V$ with respect to which the matrix representing $A$ is irreducible tridiagonal and the matrix representing $A^*$ is diagonal; (ii) There exists a basis for $V$ with respect to which the matrix representing $A^*$ is irreducible tridiagonal and the matrix representing $A$ is diagonal. We call such a pair a *Leonard pair* on $V$. There is a natural correspondence between the Leonard pairs and a class of orthogonal polynomials consisting of the $q$-Racah and related polynomials in the Askey Scheme. Let $A, A^*$ denote a Leonard pair on $V$. Associated with this pair is a certain parameter $q$ that is used to describe the eigenvalues. For the case $q \neq 1$, $q \neq -1$, we display a basis for $V$ with respect to which the matrix representing $AA^* - qA^*A$ is upper triangular and the matrix representing $A^*A - qAA^*$ is lower triangular. With respect to this basis the matrices representing $A, A^*$ are tridiagonal, with entries of an attractive form. We call this basis the *compact basis*. This is joint work with Hjalmar Rosengren. (Received August 27, 2004)