1050-05-68 **Tim Penttila*** (penttila@math.colostate.edu), Department of Mathematics, Colorado State University, Fort Collins, CO 80523. *Hemisystems of unitary spaces.*

A hemisystem H is a set of maximal totally isotropic subspaces of a finite nondegenerate unitary space of even dimension such that, for every totally isotropic point P, exactly half of the maximals on P are in H. Hemisystems were introduced by Beniamino Segre in 1965. He constructed one in the four-dimensional unitary space over the field with 9 elements, and raised the question of their existence for other spaces (necessarily over fields of odd order). In 2005, Cossidente and Penttila constructed hemisystems in all of the four-dimensional unitary spaces in odd characteristic, with the resulting hemisystems admitting four-dimensional orthogonal groups of minus type. In work to appear in J. Algebraic Combinatorics, the same authors constructed hemisystems in all the six-dimensional unitary spaces in odd characteristic. Here, in joint work with Bayens, these constructions are generalized to all even-dimensional unitary spaces in odd characteristic. Recently, van Dam, Martin and Muzychuk constructed new Q-polynomial associations schemes (that are not distance-regular graphs) from hemisystems in the four-dimensional unitary spaces and, more generally, from hemisystems of generalized quadrangles meeting the Higman bound. (Received February 23, 2009)