Daniel Kalmanovich* (dannykal@bgu.ac.il), Mikhail Klin and Sven Reichard. Some transitive actions of groups PSL(2, p) and related discrete structures. Preliminary report.

This project was originated by Eran Nevo together with the late William Thurston. A special tiling of a suitable hyperbolic space by octahedra was considered, producing a simplicial complex $X$ with $v = \frac{p^2-1}{4}$ vertices, $e = \frac{v(p^2-1)}{8}$ edges and $t = \frac{v(p^2-1)}{6}$ triangles, such that PSL(2, $p$) acts transitively on partial flags of $X$, here $p \equiv 1 \pmod{4}$. In fact, the existence of $X$ can be proved independently relying on the classical results by L. E. Dickson: the complete classification of the subgroups of the simple groups PSL(2, $p$), $p$ prime. From $X$ we can construct an association scheme $\mathcal{M}$ of order $v$ and a partially balanced incomplete block design. The automorphism group $\text{Aut}(\mathcal{M})$ contains a transitive action of PSL(2, $p$) of degree $v$. The considered class of actions of PSL(2, $p$) was used by R. Mathon for the construction of a wide class of antipodal covers of complete graphs, i.e., imprimitive distance regular graphs of diameter 3. This kind of transitive actions of the groups PSL(2, $p$) can be considered in a wider framework. Intensive computer algebra experimentation (by MK and SR) yielded a new family of non-Schurian imprimitive association schemes with 3 classes. (Received September 04, 2012)