1155-17-282 **Alex J Feingold*** (alex@math.binghamton.edu), Dept of Math Sciences, Whitney Hall, Binghamton University, 4400 Vestal Parkway East, Binghamton, NY 13902-6000. *Hyperbolic Kac-Moody algebras and groups.* Preliminary report.

Several approaches to the study of hyperbolic Kac-Moody (KM) algebras, g, and their groups, G, will be discussed. (1) New insights of Carbone-Feingold-Freyn come from the embedding of the twin building for G in the union of Tits cones in the real compact form of g. (2) New work with Kleinschmidt-Nicolai concerns imaginary root groups in hyperbolic KM groups. (3) Decomposition of g with respect to a subalgebra k provides information about the structure of g using the representation theory of k. Feingold-Frenkel (1983) studied the rank 3 hyperbolic g with Weyl group $PGL(2, \mathbb{Z})$ and affine k of type $A_1^{(1)}$. That g contains all rank 2 hyperbolic KM algebras with symmetric Cartan matrices (Feingold-Nicolai 2004). The case when k is the rank 2 "Fibonacci" hyperbolic was studied in Penta's 2016 dissertation. In addition to k itself and infinitely many irreducible highest and lowest weight k-modules, Penta found four other integrable k-modules in the decomposition of g which are neither highest nor lowest weight modules. Weight multiplicity formulas for these "non-standard" modules are not yet known, but a recursive algorithm for computing a basis provided numerical data suggestive of a Racah-Speiser type multiplicity formula. (Received January 16, 2020)