1062-17-233 **Alex J Feingold*** (alex@math.binghamton.edu), Dept of Math Sci, Binghamton University, Vestal Parkway East, Binghamton, NY 13902-6000, and **Elizabeth G Jurisich** (jurisiche@cofc.edu), Department of Mathematics, The College of Charleston, Charleston, SC 29424. *Decomposition of a rank 2 hyperbolic Kac-Moody Lie algebra with respect to the Nicolai-Olive principal $so(1,2)$ subalgebra.* Preliminary report.

Let $H(3)$ be the rank 2 hyperbolic Kac-Moody Lie algebra with Cartan matrix $\begin{bmatrix} 2 & -3 \\ -3 & 2 \end{bmatrix}$. The Nicolai-Olive principal $so(1,2)$ subalgebra S is isomorphic to sl_2 with basis $\{J_+, J_-, J_3\}$ and brackets $[J_+, J_-] = -J_3$ and $[J_3, J_\pm] = \pm J_\pm$. We study the decomposition of $H(3)$ with respect to S, into a direct sum of irreducible S-modules. This decomposition is of the form $S \oplus V(\infty) \oplus \bigoplus_{k=3}^{\infty} m_k(V(k) \oplus V(-k))$ where $V(\infty)$ is infinite-dimensional having one-dimensional weight spaces for each weight $n \in \mathbb{Z}$. The other summands in the decomposition are either highest weight S-modules, $V(-k)$ with highest weight $-k$, or lowest weight S-modules, $V(k)$, with lowest weight k. The multiplicities, m_k, with which these occur, are the dimensions of the spaces of extremal vectors in these modules. Since the bracket of any two extremal vectors of positive weight is another one, these form a Lie subalgebra whose structure determines the subalgebra $\bigoplus_{k=3}^{\infty} m_k V(k)$. We believe this is a free Lie algebra, with c_k free generators of weight k, and that the entire structure of the hyperbolic algebra reduces to knowing the sequence c_k, $k \geq 3$. (Received August 09, 2010)