1083-13-137 **Hal Schenck**, **Alexandra Seceleanu** and **Javid Validashti*** (jvalidas@illinois.edu).
Syzygies and Singularities of Tensor Product Surfaces of Bidegree $(2,1)$.

Consider the polynomial ring $R = \mathsf{k}[s,t,u,v]$ over an algebraically closed field k. Regard R as a bigraded k-algebra, in which s,t have degree $(1,0)$ and u,v have degree $(0,1)$. Let f_0,f_1,f_2,f_3 be bihomogeneous polynomials of degree $(2,1)$ with no common zeros on $\mathbb{P}^1 \times \mathbb{P}^1$ and I the ideal generated by the f_i's. In a joint work with H. Schenck and A. Seceleanu we classify all possible minimal free resolutions of R/I and we relate the syzygies of the f_i's to the singularities of the projective surface S in $\mathbb{P}^3$ parametrized by the f_i's over $\mathbb{P}^1 \times \mathbb{P}^1$. These resolutions play a key role in determining the implicit equation for S. This problem arises from a real world application in geometric modeling, where one would like to understand the implicit equation and singular locus of a parametric surface. (Received August 26, 2012)