Jarosław Buczyński, Kangjin Han, Massimiliano Mella and Zach Teitler*
(zteitler@member.ams.org). Geometry of high rank loci.

General $m \times n$ matrices have rank $\min\{m, n\}$, which is also the maximum possible rank. The loci of matrices of lower rank are well-studied. For more general notions of rank, such as tensor rank and Waring rank, once again loci of low rank points are well-known, namely, they are secant varieties. But high rank loci are almost completely mysterious.

We consider the loci of points with strictly greater than generic rank with respect to a projective variety $X$. This includes well-known notions of rank, such as tensor rank (when $X$ is a Segre variety) and Waring rank (when $X$ is a Veronese variety). We show nesting results, dimension bounds, and containment and non-containment results for high rank loci with respect to arbitrary varieties $X$. We improve upper bounds for rank with respect to any curve or homogeneous variety. In the case of Waring rank, we show that the locus of $n$-ary forms of maximal Waring rank has dimension at least $\binom{n+1}{2} - 1$. This is joint work with Jarosław Buczyński, Kangjin Han, and Massimiliano Mella. (Received February 04, 2017)