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**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)