1164-14-222 **Papri Dey*** (pdbdn@missouri.edu) and **Dan Edidin** (edidind@missouri.edu). *Real Degeneracy Loci of Matrices and their configuration.*

Let $A_1, \ldots, A_{m+1}$ be a collection of $m \times m$ matrices. We study the locus of the points x for which rank($[A_1x \ \ldots \ A_{m+1}x]$) $\leq m-1$. Thus the locus of x is an algebraic subset of $\mathbb{P}^{m-1}$, call it degeneracy locus (DL) of $m+1$ matrices. The geometry of this locus has important applications in *phase retrieval.* We show that the DL is an $m-3$ dimensional sub-scheme of degree $\binom{m+1}{2}$ in $P^{m-1}(\mathbb{C})$. In particular, when $m = 3$ the DL consists of six points in $\mathbb{P}^2(\mathbb{R})$ with quadrilateral configuration if and only if $A_i, i = 1, \ldots, 4$ are in the linear span of four fixed rank-one matrices. Besides, we derive a connection between degeneracy locus of 4 matrices and the singularity locus of the corresponding Cayley cubic symmetroid. Moreover, we show that if $A_i, i = 1, \ldots, m+1$ are in the linear span of $m+1$ fixed rank-one matrices, the DL of $m+1$ matrices satisfies generalized Desargues configuration and it corresponds to a Sylvester spectrahedron.

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