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Harm Derksen* (hderksen@umich.edu), **Zhi Jiang** (zhijiang@umich.edu), **Jonathan Gryak** (gryakj@umich.edu) and **Kayvan Najarian** (kayvan@umich.edu). *The G -stable rank for tensors and the cap set problem.*

We introduce the G -stable rank for tensors, a new notion related to stability in geometric invariant theory. We will compare it to other rank notions, such as the tensor rank, border rank and the slice rank. There are applications in data science such as dimension reduction and noise removal. Applied to the cap set problem in additive number theory, one can slightly improve upon the Ellenberg-Gijswijt upper bound for the cardinality of cap sets. (Received January 19, 2020)