1154-65-592 **Robert Gower**, **Denali Molitor*** (dmolitor@math.ucla.edu), **Jacob Moorman** and **Deanna Needell**. *Adaptive sketch-and-project methods for solving linear systems.*

We present new adaptive sampling rules and convergence guarantees for iterative sketch-and-project methods for solving linear systems. To deduce the new sampling rules, we note that the progress of one step of the sketch-and-project method depends directly on a sketched residual. Based on this insight, we derive a 1) max-distance sampling rule, which samples the sketch with the largest sketched residual 2) a proportional sampling rule, which samples proportional to the sketched residual, and finally 3) a capped sampling rule, which is a generalization of recently introduced adaptive sampling rules for the Kaczmarz method. We provide a global linear convergence theorem for each sampling rule and show that the max-distance rule enjoys the fastest convergence guarantee. This finding is verified in numerical experiments and leads us to conclude that the max-distance sampling rule is superior both experimentally and theoretically to the capped sampling rule. We provide numerical insights into implementing the adaptive strategies so that the per iteration cost is of the same order as using a fixed sampling strategy in certain settings. (Received September 07, 2019)