1139-81-592 **Shalev Ben-David*** (`shalev@umd.edu`), **Adam Bouland**, **Ankit Garg** and **Robin Kothari**.
Classical Lower Bounds from Quantum Upper Bounds. Preliminary report.

We prove lower bounds on classical measures, such as the approximate degree of a Boolean function and the approximate rank of a Boolean matrix, using quantum arguments. We prove that these lower bounds using a quantum query algorithm for the combinatorial group testing problem.

We show that for any function f, the approximate degree of computing the OR of n copies of f is $\Theta(\sqrt{n})$ times the approximate degree of f. No such general result was known prior to our work, and even the lower bound for the OR of ANDs function was only resolved in 2013.

We then prove an analogous result in communication complexity, showing that the logarithm of the approximate rank (or more precisely, the approximate γ_2 norm) of $F : X \times Y \to \{0,1\}$ grows by a factor of $\tilde{\Theta}(\sqrt{n})$ when we take the OR of n copies of F. As a corollary, we give a new proof of Razborov's celebrated $\Omega(\sqrt{n})$ lower bound on the quantum communication complexity of the disjointness problem. (Received February 20, 2018)