

# Extended formulations, non-negative factorizations and randomized communication protocols\*

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## Abstract

We show that the logarithm of the non-negative rank of a non-negative matrix is, up to additive constants, equal to the minimum complexity of a randomized communication protocol computing the matrix on average. We use this connection to prove new conditional lower bounds on the sizes of extended formulations, in particular, for perfect matching polytopes.

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\*Draft version, please do not distribute.