1086-05-1847 **Holger Dell*** (`holger@cs.wisc.edu`), University of Wisconsin - Madison, Department of Computer Sciences, 1210 West Dayton Street, Madison, WI 53706-1685. *How Fast Can We Compute Combinatorial Problems such as the Permanent and the Tutte Polynomial?*

Ryser's famous inclusion-exclusion formula for the permanent is a major combinatorial insight, and it can be used to compute the permanent of any $(d \times d)$-matrix in time $2^d \cdot \mathrm{poly}(d)$. Conversely, I claim that if the permanent can be computed in time $1.99^d \cdot \mathrm{poly}(d)$, then there is a new deep combinatorial insight into the structure of the permanent that we haven't found yet. Ruling out such an algorithm would philosophically say that it is Ryser's formula that really captures the complexity of the permanent.

In recent work, we proved that the permanent cannot be computed in time $2^{o(d)} \cdot \mathrm{poly}(d)$ unless the exponential time hypothesis (ETH) fails, which is a reasonable assumption from computational complexity theory. In the talk, we will discuss this result and a similar result for the Tutte polynomial. Furthermore, we will explore whether it is possible to rule out algorithms for the permanent that run in time $1.99^d \cdot \mathrm{poly}(d)$.

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