1167-68-251 **Josh Alman*** (jalman@seas.harvard.edu) and **Virginia Vassilevska Williams**. *A Refined Laser Method and Faster Matrix Multiplication.*

The complexity of matrix multiplication is measured in terms of ω, the smallest real number such that two $n \times n$ matrices can be multiplied using $O(n^{\omega+\varepsilon})$ field operations for all $\varepsilon > 0$; the best bound until now is $\omega < 2.37287$ [Le Gall'14]. All bounds on ω since 1986 have been obtained using the so-called laser method, a way to lower-bound the 'value' of a tensor in designing matrix multiplication algorithms. The main result of this paper is a refinement of the laser method that improves the resulting value bound for most sufficiently large tensors. Thus, even before computing any specific values, it is clear that we achieve an improved bound on ω, and we indeed obtain the best bound on ω to date:

$$\omega < 2.37286.$$

The improvement is of the same magnitude as the improvement that [Le Gall'14] obtained over the previous bound [Vassilevska W.'12]. Our improvement to the laser method is quite general, and we believe it will have further applications in arithmetic complexity. (Received March 08, 2021)