1121-05-79 **Yinghui Wang*** (yinghui@mit.edu), Massachusetts Institute of Technology, Department of Mathematics, 77 Massachusetts Avenue, Cambridge, MA 02139, and **Richard P. Stanley** (rstan@math.mit.edu), Massachusetts Institute of Technology, Department of Mathematics, 77 Massachusetts Avenue, Cambridge, MA 02139. *The Smith normal form distribution of a random integer matrix.*

We show that the density μ of the Smith normal form (SNF) of a random integer matrix exists and equals a product of densities μ_{p^s} of SNF over $\mathbb{Z}/p^s\mathbb{Z}$ with p a prime and s some positive integer. Our approach is to connect the SNF of a matrix with the greatest common divisors (gcds) of certain polynomials of matrix entries, and develop the theory of multi-gcd distribution of polynomial values at a random integer vector. We also derive a formula for μ_{p^s} and compute the density μ for several interesting types of sets. Finally, we determine the maximum and minimum of μ_{p^s} and establish its monotonicity properties and limiting behaviors. (Received July 12, 2016)