1031-05-61 **Bill Cuckler*** (cuckler@math.udel.edu), University of Delaware, Department of Mathematical Sciences, Ewing Hall, Newark, DE 19716, and **Jeff Kahn**. *Entropy bounds for perfect matchings and Hamiltonian cycles.*

For a graph $G = (V, E)$ and $\mathbf{x} : E \to \Re^+$ satisfying $\sum_{e \ni v} \mathbf{x}_e = 1$ for each $v \in V$, set $h(\mathbf{x}) = \sum_e \mathbf{x}_e \log(1/\mathbf{x}_e)$ (with $\log = \log_2$). We show that for any n-vertex G, random (not necessarily uniform) perfect matching $\mathbf{f}$ satisfying a mild technical condition, and $\mathbf{x}_e = \Pr(e \in \mathbf{f})$,

$$H(\mathbf{f}) < h(\mathbf{x}) - \frac{n}{2} \log e + o(n)$$

(where H is binary entropy). This implies a similar bound for random Hamiltonian cycles.

Specializing these bounds completes a proof of a quite precise determination of the numbers of perfect matchings and Hamiltonian cycles in Dirac graphs (graphs with minimum degree at least $n/2$) in terms of $h(G) := \max \sum_e \mathbf{x}_e \log(1/\mathbf{x}_e)$ (the maximum over $\mathbf{x}$ as above). For instance, for the number, $\Psi(G)$, of Hamiltonian cycles in such a G, we have

$$\Psi(G) = \exp_2[2h(G) - n \log e - o(n)].$$

(Received August 01, 2007)