1086-VO-532 **Rachel R Insoft*** (`rinsoft@wellesley.edu`) and **Amanda G Bower** (`amandarg@umd.umich.edu`). *Mind the Gap: Distribution of Gaps in Generalized Zeckendorf Decompositions.*

Zeckendorf proved that any positive integer can be decomposed into a unique sum of non-adjacent Fibonacci numbers, F_n. Lekkerkerker showed the average number of summands in a decomposition of an integer in $[F_n, F_{n+1})$ is $\frac{n}{\phi^2+1} + O(1)$, where ϕ is the golden mean. Moreover, these two theorems generalize to any positive linear recurrence: $A_n = c_1 A_{n-1} + \cdots + c_L A_{n+1-L}$. Further, the number of summands in decompositions for integers in $[A_n, A_{n+1})$ converges to a Gaussian distribution as $n \to \infty$.

We study the distribution of gaps between summands in generalized Zeckendorf decompositions. We prove that the probability of a gap larger than the recurrence length converges to geometric decay with decay rate equal to the largest root of the characteristic polynomial of the recurrence, and the distribution of smaller gaps depend on the coefficients of the recurrence (which we analyze combinatorially). These techniques work for related systems as well, such as the signed Zeckendorf decomposition. Also, given any integer $m \in [A_n, A_{n+1})$, as $n \to \infty$ almost surely the gap measure associated to m converges to the average gap measure. (Joint with Olivia Beckwith, Louis Gaudet, Shiyu Li, Steven J Miller, and Philip Tosteson) (Received September 06, 2012)