Reversible primes

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Abstract: The properties of the digits of prime numbers and various other sequences of integers have attracted great interest in recent years. For any positive integer k, we denote by $\overleftarrow{k}$ the *reverse* of k in base 2, defined by

$$\overleftarrow{k} = \sum_{j=0}^{n-1} \varepsilon_j \, 2^{n-1-j} \quad \text{where} \quad k = \sum_{j=0}^{n-1} \varepsilon_j \, 2^j$$

with $\varepsilon_j \in \{0, 1\}$, $j \in \{0, \ldots, n-1\}$, $\varepsilon_{n-1} = 1$. A natural question is to estimate the number of primes $p \in [2^{n-1}, 2^n)$ such that $\overleftarrow{p}$ is prime. We will present a result which provides an upper bound of the expected order of magnitude. Our method is based on a sieve argument and also allows us to obtain a strong lower bound for the number of integers k such that k and $\overleftarrow{k}$ have at most 8 prime factors (counted with multiplicity). We will also present an asymptotic formula for the number of integers $k \in [2^{n-1}, 2^n)$ such that k and $\overleftarrow{k}$ are squarefree.
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