PRIME NUMBERS WITH A FIXED NUMBER OF ONE BITS OR ZERO BITS IN THEIR BINARY REPRESENTATION

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ABSTRACT. We study the distribution of prime numbers that have a given number of one bits in their binary representation, and of those that have a given number of zero bits. We consider basic questions such as whether there are infinitely many of them, and explain their distribution in residue classes modulo small primes. We prove the unexpected result that, for $m \geq 3$, there is no prime number with precisely 2^m bits, exactly two of which are zero bits.