On Partitions into Powers of Primes and Their Difference Functions

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Abstract. In this paper, we extend the approach first outlined by Hardy and Ramanujan for calculating the asymptotic formulae for the number of partitions into $r$-th powers of primes, $p_{r,\infty}(n)$, to include their difference functions. In doing so, we rectify an oversight of said authors, namely that the first difference function is perforce positive for all values of $n$, and include the magnitude of the error term.