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Consecutive integers divisible by a power of their largest prime factor

Given integers $k \geq 2$ and $\ell \geq 2$, the Chinese Remainder Theorem guarantees the existence of k consecutive integers divisible respectively by preassigned prime powers p_j^ℓ , $j = 1, \dots, k$. However, there is no guarantee that the respective largest prime factors of the resulting k consecutive integers will be precisely the chosen p_j 's. How can we make it so? Using elementary, analytic and probabilistic approaches, we shed some light and raise many questions regarding this difficult problem. This is joint work with Matthieu Moineau.