

# Bohr's theorem for Beurling integer systems

Karl-Mikael Perfekt, NTNU, Norway

Abstract: Let  $\{q_n\}_{n \geq 1}$ ,  $1 < q_n \rightarrow \infty$ , be a sequence of numbers, which we refer to as Beurling primes. We consider Dirichlet series over the "integers" which are multiplicatively generated by the primes. In the classical setting, where  $\{q_n\}$  is just the sequence of ordinary primes, Bohr's theorem holds: if a Dirichlet series  $f$  converges somewhere and has an analytic extension which is bounded in a half-plane, then it actually converges uniformly in every smaller half-plane. Our main goal, achieved through a probabilistic method, is to find a system of Beurling primes for which both Bohr's theorem and the Riemann hypothesis are valid. This provides a counterexample to a conjecture of H. Helson concerning outer functions in Hardy spaces of Dirichlet series.

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