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Pointwise convergence and the Wadge hierarchy

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Abstract: We show that if X is a Σ^1_1 separable metrizable space which is not σ-compact then $C^*_p(X)$, the space of bounded real-valued continuous functions on X with the topology of pointwise convergence, is Borel-Π^1_1-complete. Assuming projective determinacy we show that if X is projective not σ-compact and n is least such that X is Σ^1_n then $C_p(X)$, the space of real-valued continuous functions on X with the topology of pointwise convergence, is Borel-Π^1_n-complete. We also prove a simultaneous improvement of theorems of Christensen and Kechris regarding the complexity of a subset of the hyperspace of the closed sets of a Polish space.

Keywords: Wadge hierarchy, function spaces, pointwise convergence
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