

# A $C(K)$ -space with few operators

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Banach Algebras and Applications

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Joint work with Piotr Koszmider (IMPAN, Warsaw)

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$$X_{\mathcal{A}} = \overline{\text{span}}\{1_A : A \in \mathcal{A} \cup [\mathbb{N}]^{<\omega}\} \subseteq \ell_\infty,$$

where  $1_A$  is the indicator function of  $A$  and  $[\mathbb{N}]^{<\omega}$  the set of finite subsets of  $\mathbb{N}$ .

**Check:**  $X_{\mathcal{A}}$  is a self-adjoint subalgebra of  $\ell_\infty$ .

**Gelfand–Naimark Theorem:**  $X_{\mathcal{A}} \cong C_0(K_{\mathcal{A}})$  for some locally compact Hausdorff space  $K_{\mathcal{A}}$ .

Origins:

- ▶ Banach spaces of the form  $X_{\mathcal{A}}$  were first studied by Johnson and Lindenstrauss (*Israel J. Math.* 1974).
- ▶ Locally compact Hausdorff spaces of the form  $K_{\mathcal{A}}$  were first studied by Alexandroff and Urysohn (1920's).

Terminology: AU-compactum, (Isbell–)Mrówka space,  $\Psi$ -space.



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More precisely, the sets

$$U(A, F) = \{x_n : n \in A \setminus F\} \cup \{y_A\}, \quad \text{where } F \in [\mathbb{N}]^{<\omega},$$

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**Theorem** (Koszmider, *PAMS* 2005, assuming CH; Koszmider–L, *Adv. Math.* 2021, within ZFC).

*There is an uncountable, almost disjoint family  $\mathcal{A} \subseteq [\mathbb{N}]^\omega$  such that*

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