Kernels and cohomology groups for some finite covers

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ABSTRACT We extend work of G. Ahlbrandt and M. Ziegler to give a classification of the finite covers with fibre group of prime order p for the projective space over the field with p elements, and for the Grassmannian of k-sets from a disintegrated set (for $k \in \mathbb{N}$).
AMS classification: 03C35 and 20B27.

This paper is a contribution to the study of the fine detail of the class of (countable) totally categorical structures, in particular the almost strongly minimal ones. The approach we adopt is the one initiated by G. Ahlbrandt and M. Ziegler in [1] and [2] and is purely algebraic. The results we obtain are explicit classification results (under restrictive hypotheses) and are phrased in the terminology of finite covers. It may be helpful if we give a brief impression of them without using this terminology.

Corollary 2.13 represents a classification of certain strongly minimal $\aleph_0$-categorical structures where the associated strictly minimal set is a projective geometry over a prime field. Theorems 3.6 and 3.12 classify certain almost strongly minimal structures in which the associated strictly minimal set is disintegrated. In all these cases it is assumed that the relative automorphism group of the structure over the strictly minimal set is abelian of prime exponent. A key question is whether there exists an expansion of the structure which is biinterpretable with the strictly minimal set (*splitting*). One corollary of our results is that this happens in all cases we consider.