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# A higher index for finite-volume locally symmetric spaces

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Let  $G$  be a connected real semisimple Lie group, and  $K < G$  maximal compact. For a discrete subgroup  $\Gamma < G$ , we have the locally symmetric space  $X = \Gamma \backslash G/K$ . If  $X$  is smooth and compact, then Atiyah-Singer index theory is a source of useful and computable invariants of  $X$ . One then also has the higher index, with values in the  $K$ -theory of the  $C^*$ -algebra of  $\Gamma$ . In many relevant cases  $X$  is noncompact, but still has finite volume. Then Moscovici showed in the 1980s that a relevant index of Dirac operators on  $X$  can still be defined. Barbasch and Moscovici computed this index in terms of group- and representation-theoretic information in the case of real rank 1 groups. (Stern generalised this to groups of higher real rank.) With Hao Guo and Hang Wang, we construct a  $K$ -theoretic index, from which Moscovici's index, and the individual terms in Barbasch and Moscovici's index theorem, can be extracted and computed.

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