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Chief factors in Polish groups

(Joint work with Colin Reid.) For a Polish group $G$, closed normal subgroups $L < K$ of $G$ form a chief factor $K/L$ if there is no closed normal subgroup of $G$ strictly between $L$ and $K$. Chief factors play an important role in the structure theory of finite groups. Surprisingly, the theory of chief factors admits a natural and useful extension to the setting of Polish groups. We discuss this theory and its two key ingredients, the association relation and normal compressions. We then outline a Schreier refinement theorem and a trichotomy theorem for topologically characteristically simple Polish groups. Time permitting, we discuss applications to locally compact Polish groups and finitely generated branch groups.