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# 6. Topology

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Biller, Harald, Universität Stuttgart, Germany

**Actions of large compact Lie groups on spheres**

Let $G$ be a compact connected Lie group acting continuously on an $n$-sphere. (Certain cohomology spheres are admissible.) For sufficiently large $G$, the Lie algebra $\mathfrak{g}$ or even the equivalence class of the action is determined. Precisely, if $\dim G \geq \dim \mathrm{SO}_{n-4}\mathbb{R} + 8$ then $\mathfrak{g}$ embeds into $\mathfrak{o}_{n+1}\mathbb{R}$. The proof involves the classification of transitive actions (*A. Borel*, 1949 and '50) and a method due to *L. N. Mann* (1966). If $\dim G \geq \dim \mathrm{SO}_{n-2}\mathbb{R} + 2$ then the action is equivalent to the natural action of a closed subgroup of $\mathrm{SO}_{n+1}\mathbb{R}$ on $\mathbb{S}_n$. This is proved by techniques developed by *R. W. Richardson* (1961). The results are applied to topological *Tits* buildings.