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Direct Limits of Zuckerman Derived Functor Modules

We construct representations of certain direct limit Lie groups $G = \lim G^n$ via direct limits of Zuckerman derived functor modules of the groups G^n . We show such direct limits exist when the degree of cohomology can be held constant, and discuss some examples for the groups $Sp(p, \infty)$ and $SO(2p, \infty)$, relating to the discrete series and ladder representations. We show that our examples belong to the “admissible” class of Ol’shanskii, and also discuss the globalizations of the Harish-Chandra modules obtained by the derived functor construction. The representations constructed here are the first ones in cohomology of non-zero degree for direct limits of non-compact Lie groups.