

# Special representations of nilpotent Lie groups and the associated Poisson representations of current groups

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In this paper we describe the new model of the representations of the current groups with a semisimple Lie group of the rank one. In the earlier papers of 70-80-th (Araki, Gelfand-Graev-Vershik) had posed the problem about irreducible representations of the current group for  $SL(2, \mathbb{R})$ , and was used for this the well-known Fock space-structure

That construction could be applied to the arbitrary locally compact group, and is based on a so called special representation of the original group  $G$ , with nontrivial 1-cohomology. A new construction uses the special property of one dimensional extensions (semi-direct product) of the nilpotent groups which allows immediately to produce the special representation of the group and then to apply the quasi-Poisson construction from the previous papers by authors in order to construct the representation of current group. The parabolic subgroup of the semisimple Lie group of rank one has such semidirect product, and special representation of it can be extended onto whole semisimple group. As result we obtain needed new model of the irreducible representation of semi-simple current groups.

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