



# Quantum isometry groups of symmetric groups

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We identify the quantum isometry groups of spectral triples built on the symmetric groups with length functions arising from the nearest-neighbor transpositions as generators. It turns out that they are isomorphic to certain "doubling" of the group algebras of the respective symmetric groups. We discuss the doubling procedure in the context of regular multiplier Hopf algebras. In the last section we study the dependence of the isometry group of  $S_n$  on the choice of generators in the case  $n=3$ . We show that two different choices of generators lead to non-isomorphic quantum isometry groups which exhaust the list of non-commutative non-cocommutative semisimple Hopf algebras of dimension 12. This provides non-commutative geometric interpretation of these Hopf algebras.

Comments: LaTeX, 18 pages, some computation simplified, typos corrected

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