Algebraic Bethe Ansatz for spinor R-matrices

Reply to Referee 1

I thank the referee for raising the point about the possible contradiction between the commutation relations of fundamental L-operators and their coproduct rule. Recall that the universal R-matrix $\mathscr{R}$ is an element in a completion of $U_q(\mathfrak{b}_+)\otimes U_q(\mathfrak{b}_-)$, where $\mathfrak{b}_\pm$ are the standard Borel subalgebras. There is a number of ways of defining the L-operators consistently. For instance,

$$L^+(u) = (\pi_u \otimes \mathrm{id})\,\mathscr{R}^{-1}, \qquad L^-(u) = (\mathrm{id}\otimes \pi_u)\,\mathscr{R}, \qquad R(u,v) = (\pi_u \otimes \pi_v)\,\mathscr{R}^{-1}$$

gives the wanted defining relations and the wanted coproduct rule,

$$\Delta(L^\pm_{ij}(u)) = \sum_k L^\pm_{ik}(u)\otimes L^\pm_{kj}(u).$$

For $U_q(\widehat{\mathfrak{gl}}_N)$ this was explicitly demonstrated by J. Ding and I. B. Frenkel in Comm. Math. Phys. 156, 277–300 (1993) and by E. Frenkel and E. Mukhin in Sel. Math. 8, 537–635 (2002). For $U_q(\widehat{\mathfrak{so}}_N)$ this could be verified using the isomorphism constructed recently by N. Jing, M. Liu and A. Molev in SIGMA 16, 043, (2020).

Kind regards,
Vidas Regelskis