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Tamm-Dancoff as the contraction limit of the Richardson-Gaudin equations for pairing[1] STIJN DE BAERDEMACKER[2], Ghent University — The pairing interaction, resulting from the $J = 0$ component of the short-range nucleon-nucleon interaction, plays a dominant role in the structure of atomic nuclei. The BCS treatment of the pairing Hamiltonian has provided considerable insight in the problem, however there is need for a canonical (number of particle conserving) technique, due to the finite number of particles in the system. One way around is to approximate a pair of nucleons as a single boson-like entity, however violating the underlying Pauli principle. Eventually it can be shown that, relying on the early studies of Richardson & Gaudin, the reduced pairing Hamiltonian is exactly diagonalisable by means of a canonical Bethe Ansatz eigenstate, provided the set of non-linear Richardson-Gaudin equations are solved. In the present contribution it will be shown how one can regain the Tamm-Dancoff dispersion relation from the Richardson-Gaudin equations by deforming the $su(2)$ quasi-spin algebra towards the Heisenberg-Weil algebra in the contraction limit, leaving the Hamiltonian exactly solvable along the deformation path.

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