



Mathematical Physics

Quasibosons composed of two q-fermions: realization by deformed oscillators

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Composite bosons, here called $\{it quasibosons\}$ (e.g. mesons, excitons, etc.), occur in various physical situations. Quasibosons differ from bosons or fermions as their creation and annihilation operators obey non-standard commutation relations, even for the "fermion+fermion" composites. Our aim is to realize the operator algebra of quasibosons composed of two fermions or two q-fermions (q-deformed fermions) by the respective operators of deformed oscillators, the widely studied objects. For this, the restrictions on quasiboson creation/annihilation operators and on the deformed oscillator (deformed boson) algebra are obtained. Their resolving proves uniqueness of the family of deformations and gives explicitly the deformation structure function (DSF) which provides the desired realization. In case of two fermions as constituents, such realization is achieved when the DSF is quadratic polynomial in the number operator. In the case of two q-fermions, $q \neq 1$, the obtained DSF inherits the parameter q and does not continuously converge when $q \rightarrow 1$ to the DSF of the first case.

Comments: 24 pages; v2: new appendix with particular examples given, few references added, minor textual changes made

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