It is well known (Refs. 1,2) that Parafermi and Parabose statistics are natural extensions of the usual Fermi and Bose ones, enhancing trilinear (anti)commutation relations instead of bilinear ones. Due to this generalization, positive parameters appear: the so-called orders of paraquantization $p \ (= 1, 2, 3, \ldots)$ and $h_0 \ (= 1/2, 1, 3/2, \ldots)$, respectively, the first value leading in each case to the usual statistics. The superposition of the parabosonic and parafermionic operators gives rise to parasupermultiplets (Refs. 3-5) for which mixed trilinear relations have to be envisaged. In the particular case of quanta of the same order ($p = 2h_0$), these relations have already been studied (Ref. 6) leading to two (non equivalent) sets: the relative Parabose and the relative Parafermi ones. For the specific values $p = 1 = 2h_0$, these sets reduce to the well known supersymmetry (Refs. 7,8).

Coherent states associated with this last model have been recently put in evidence through the annihilation operator point of view (Ref. 9) and the group theoretical approach or displacement operator context (Refs. 10-12). We propose here to realize the corresponding studies within the new context $p = 2 = 2h_0$, being then directly extended to any order of paraquantization. Even if we have to take account of the two relative sets separately, the arguments are so similar in both cases that we just concentrate on the Parabose set in the following. Within the relations characterizing such a model, it is easy to prove that the operator $A = a + \frac{1}{2} a^\dagger b^\dagger = a an (b, b^\dagger)$ are the usual bosonic (fermionic) annihilation and creation operators] exactly plays the role of a generalized annihilation operator i.e. satisfying the expected commutation relation with the hamiltonian and displaying the right action on the state basis of the Hilbert space (Refs. 13,14). Parasupercoherent states (Refs. 13,14) $|z\rangle$ are then defined as eigenstates of this operator $A$ with eigenvalues being arbitrary complex numbers. The corresponding uncertainty relation is found to be nearly $1$ ($\tilde{h} = 1$).

The group theoretical approach asks for the consideration of a specific representation of the para-operators: the Green-Cusson Ansätze (Refs. 1,15) in which each operator is decomposed into a sum of two other ones related to the usual bosonic scaling operators and the Pauli matrices. By introducing parameters realized through two by two matrices with Grassmannian elements, we are led to the corresponding color supergroups (Ref. 16) and we are thus able to define the associated coherent states by a unitary representation of these groups. Convenient Baker-Campbell-Hausdorff relations (Ref. 12) are of particular interest in this study. Moreover the states obtained in this way are
effective eigenstates of the operator $A$ introduced before. The three usual definitions of ordinary coherent states are thus satisfied in this parasupersymmetric context.

REFERENCES


