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Soliton like excitations and inconmensurate phases in half doped manganites. LUIS BREY, ICMM-Madrid, P.B. LITTLEWOOD , Cambridge University — In half doped manganites, the Jahn-Teller effect, the antiferromagnetic coupling between Mn spins and the directionality in the hopping amplitude conspire to create an exotic spin, charge and orbital ordered phase (CE). In this phase the $x-y$ plains are coupled antiferromagnetically and into the layers the structure consists of zigzag chains with steps formed by three Mn ions. Along the chains the occupied Mn e_g orbitals are ordered in the form ...$(2x^2-r^2)-(x^2-y^2)-(3y^2-r^2)-(x^2-y^2)$.... Using a pseudospin notation, $|x^2-y^2>=\uparrow$ and $|3z^2-r^2>=\downarrow$, the order along the chain is described by the x-component of the pseudospin $\tau_x(i) \sim \cos(\frac{\pi}{4}i)$. This state is degenerated with a state with pseudospin order $\tau_x(i) \sim \cos(\frac{\pi}{4}i+\pi)$, and associated with this degeneracy, we expect there to exist soliton-like excitations. The solitons can have charge states Q=0, $\pm n\frac{e}{2}$. We study the dependence of the soliton properties on the Jahn-Teller coupling and Hubbard repulsion and we conclude that the solitons could be the low energy charged excitations of the CE phase. When a finite density of charge excitations exists, the ground state is an array of solitons, that develop an incommensurate charge, orbital and spin modulation.

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