

Peer Review

Review of: "Dynamical Edge Modes in Yang-Mills Theory"

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The paper considers Yang-Mills theory on a Cauchy slice with a boundary and studies the decomposition of the phase space variables into bulk and edge modes.

The analysis closely follows previous work by one of the authors and collaborators on Maxwell theory but takes into account the additional complications due to the non-Abelian gauge symmetry.

By introducing a suitable decomposition of the phase space variables, as well as imposing a specific 'dynamical edge mode' boundary condition, the authors are able to show that the symplectic structure and the Poisson brackets decompose into their distinct bulk and edge counterparts. However, it is shown that the Hamiltonian fails to decompose in the same way, so the bulk and edge modes are coupled in the dynamical evolution.

The paper is clearly written, and the amount of detail provided is appropriate.

I recommend publication in Qeios, provided the authors clarify further the consequences of the failure of the Hamiltonian to split into bulk and edge modes. In particular, it seems important to clarify whether the bulk conditions (3.3) and (3.6), imposed in order to achieve the bulk-edge splitting of the symplectic structure, are preserved by the temporal evolution. This a priori does not seem to be the case. The authors are encouraged to comment on the implications of this.

A less important point: it is not clear what the role of the arbitrary function S introduced in eq. (3.1) is; the authors may add a comment clarifying the reason for introducing it.

Declarations

Potential competing interests: No potential competing interests to declare.