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Cluster separability and currents in the Poincaré invarant three-nucleon problem[1] MARK TUCKER, University of Iowa, BRADLEY KEISTER, NSF, WAYNE POLYZOU, University of Iowa — We examine the quantitative implication of the requirement of cluster separability in Poincaré-invariant formulations of the quantum mechanical three-body problem. One can formulate the problem using two-body interactions in a representation that satisfies Poincaré invariance, but which violates cluster separability. An additional non-trivial unitary transformation restores cluster properties. This unitary transformation is needed for a consistent computation of matrix elements of currents that have cluster expansions in systems of three particles or more, as well as bound-state properties of four particles or more. We exhibit the nature and size of these effects in a model form factor of a three-body system consisting of a nucleon in the presence of a spectator deuteron by comparing the calculation of current matrix elements with and without these unitary transformations.

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