Abstract Submitted
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Symmetries and configurations of a molecular quantum system composed with four identical nuclei[1] NICOLAS DOUGUET, University of Central Florida, Orlando, FL, ELIE ASSEMAT, Institut Carnot de Bourgogne, France, VIATCHESLAV KOKOOULINE, University of Central Florida, Orlando, FL — We discuss in details the symmetry of a molecular system of four identical nuclei, surrounded by electronic clouds, shaped as different well separated fragments at large distances from one to another. Namely we will consider respectively the system as (1) two dimers, (2) a trimer and a free particle and (3) a dimer and two free particles. Our general approach to treat this problem consists at first on exhibiting the form of the eigenspaces of the large distance Hamiltonian, labeled by constants of motion of the system, for each configuration. The study of the symmetry of the system can then be performed by decomposition of these subspaces in irreducible representations of the total symmetry group G_{48} of four identical particles via the different sub-groups of symmetry of the large distance Hamiltonian. The obtained results could be for instance a basis of interest to study the different recombinations or break down of four identical particles after collisions allowed by symmetry conservation. Selection rules, as well as allowed quantum states respecting the fermionic or bosonic nature of the particles, can be explicitly determined from these results.

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