Structure of Bohr Type Nuclear Collective Spaces

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Nuclear collective models can be constructed in various ways. One of the most popular and effective method is the prescription given by Bohr and his collaborators many years ago. This method leads to constructions of nuclear collective spaces corresponding to the appropriate classical models.

In this seminar the general structure of such spaces generated by sets of spherical tensors representing different kinds of nuclear deformations (motions) is revisited. The special features of such spaces constructed in the intrinsic frame are shown. It is, for example, a more reach structure of intrinsic collective space than the corresponding model constructed in the laboratory frame. There are also shown some difficulties related to non-uniqueness of transformations between both: laboratory and intrinsic frames. Using of the intrinsic frame is crucial because it allows to split the rotational degrees of freedom from vibrational ones.

It is also shown, that the Bohr type procedure leading to the nuclear collective Hamiltonian gives, in fact, the non-physical Hamiltonian which has to be "renormalized" in an appropriate way to get physical solutions. The last problem is strongly related to the structure of nuclear collective intrinsic spaces.