

Magnetic rotation – Past, Present and Future

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Magnetic-dipole Rotational (MR) bands were discovered about 15 years ago without any theoretical prediction in contrast to the super-deformed (SD) bands which were predicted long ago. First identification of a quasi-rotational structure as MR band occurred around 1992 although Kr-isotopes probably have the first set of data hiding the signatures of MR bands as shown by us [1]. Our first compilation of MR bands [2] had listed 120 MR bands in 56 nuclides which have now grown to more than 180 bands in 80 nuclides [3]. The largest body of data exists in the Pb region. Work in the area of MR is still continuing at a steady rate of about 8-10 papers published every year.

We have observed new MR bands in the A=130 mass region in ^{137}Pr , ^{139}Nd , ^{135}Ba nuclei [4-7]. This has led to the observation of the smallest MR bands in ^{137}Pr , multiple minima in the γ -deformation in ^{135}Ba , coexistence of band-structure based on these minima and band crossing in MR bands. These results will be reviewed along with theoretical calculations.

There are still a number of questions related to MR bands which have not been fully resolved. The role of neutrons/protons in magnetic rotation still needs to be delineated. Do the MR bands follow the I(I+1) behaviour? Are these structures as regular as normal rotational bands? How important is the existence of deformation for MR bands? What is the behaviour of the “moment of inertia” with spin? These and other similar questions will also be addressed in the talk.

References

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