

# Exchange splitting of the photoemission core levels in Eu and its compounds

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The intra-atomic exchange interaction leads to the known effect of splitting of the photoemission core s levels and to the complex multiplet structures of the p and d levels. The divalent Eu with its 4f7 configuration and maximal spin value of 7/2 shows in photoemission well resolved structures similar to those found in Gd. The trivalent Eu ion has the 4f6 configuration and due to the Hund's rules the total momentum  $J=L-S=0$ . As a consequence EuF3, where Eu is trivalent, exhibits a weak van Vleck like paramagnetism. However, our investigations showed that both Eu 4s and 5s levels in EuF3 (crystal, amorphous thin film, ultrathin MBE grown layers) exhibit in photoemission doublets characteristic for exchange splitting. At the same time the emission from the 4d level do not show any visible splitting. The same situation was found for Eu doped LiYF4 where Eu ions are nominally trivalent. Our studies aim to find how coupling between spins of a photo-hole and 4f level depends on the spin-orbit interactions within the 4f shell and photo-excited level. Moreover, preliminary results of magnetic circular dichroism in photoemission have shown for EuF3 ultrathin layers a clear dichroic effect in valence band.

9.7 cm

13.4 cm

## Subject category :

4. Rare Earths and Actinides, Alloys and Compounds

## Presentation mode :

poster

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