The $^1S_0$ level of the Pr^{3+} doped $LiYF_4$

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Transparent fluorides, when doped with rare-earth ions (RE), are promising materials for solid-state optical devices. *LiYF*$_4$ is a suitable host for RE incorporation and already have applications as a laser in the IR region. In the present work, we report experimental as well as theoretical and simulation study of optical properties of the Pr^{3+} doped *LiYF*$_4$. The synthesis of the crystal was performed following the Czochralski method and the initial concentration of the PrF_3 has been 2mol%. Emission and excitation spectra of the doped sample were measured at room temperature. The identification of the $^3H_4$-$^1S_0$ transitions as well as the identification of the $^1S_0$ level at 46583cm^{-1} and the 3H4 levels at 0, 226, 636, 1057 and 1388 cm^{-1} was done through the excitation spectrum, monitored at 638.5 nm. We have input the spherical coordinates of the first nearest fluorine ions of the Pr^{3+} ion in the crystal field parameters equations. The set of non-zero B^k_q determines the local symmetry of the Pr^{3+} ion and were input in the calculation of the Pr^{3+} energy levels splitting. (This work was partially funded by MCT/PADCTII/CNPq, FINEP and CAPES)