

Magnetic resonance investigation of F centers in LIF caused by ionizing radiation

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Damage caused in lithium fluoride crystals by γ -rays, electrons, and heavy ions includes, besides other point defects, F centers and their agglomerates. We have studied the paramagnetic F centers by measurements of the nuclear spin relaxation (NSR) of ^{19}F and ^7Li , the return of the magnetic circular dichroism of absorption (MCDA) after switching off the resonant microwave field and by optical absorption. The magnetic resonance experiments were performed over a range of defect concentrations to measure the longitudinal spin lattice relaxation times T_{1e} of the F centers. Over several orders of magnitude, the NSR rate T_{1e}^{-1} is proportional to the concentration of F centers. Measurements at different frequencies and temperatures suggest a spin diffusion limited NSR process. Raising the temperature of the crystal initiates an annealing process that can be observed as a decrease of the NSR rate.