Abstract Submitted
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Optical Homogeneous Linewidths and Spectral Diffusion at 1.5 microns in Mixed Er^{3+}:Eu^{3+}:Y_2SiO_5 Studied by Photon Echo[1] R.L. CONE, T. BÖTTGER[2], C.W. THIEL, Y. SUN[3], Montana State University — Er^{3+}-doped materials are important for spectral hole burning applications at 1.5 micron communication wavelengths, including analog signal processing and laser frequency stabilization. Doping Er^{3+}:Y_2SiO_5 with Eu^{3+} is shown to broaden the inhomogeneous linewidth of the $^4I_{15/2}$ - $^4I_{13/2}$ transition without significantly broadening the homogeneous linewidth. This maximizes bandwidth in real-time analog signal processing applications without compromising resolution. Photon echo and stimulated photon echo decays between 1.5 K and 5.5 K were measured along with angle- dependent Zeeman spectra and site-selective absorption and emission. Detailed modeling of observed spectral diffusion induced by spin dynamics considered Er^{3+}-Er^{3+} dipole interactions driven by direct-phonon processes. The model describes and explains observed behavior and predicts behavior vs. magnetic field, crystal temperature, Er^{3+} dopant concentration, and crystal orientation. * Currently at University of San Francisco ** Currently at University of South Dakota

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