

# Atomic frequency comb memory in an isotopically pure $^{143}\text{Nd}^{3+}:\text{Y}^7\text{LiF}_4$ crystal

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## Abstract

© 2016 Astro Ltd. We implemented the atomic frequency comb protocol for optical quantum memory in an isotopically pure crystal of  $\text{Y}^7\text{LiF}_4$  doped by  $^{143}\text{Nd}^{3+}$  ions. Echo signals were observed on the  $4I_{9/2}(1)-4F_{3/2}(1)$  transition, which had inhomogeneous broadening much smaller than the hyperfine splitting of the ground and excited states. We performed hole-burning spectroscopy measurements on several transitions, obtaining information about the hyperfine state lifetimes. An intrinsic hole structure was found on some of the transitions, which allowed us to prepare a comb structure with two clearly defined periods and to observe echo pulses with different time delays.

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## Keywords

atomic frequency comb, inorganic crystals doped with rare earth metal ions, quantum memory