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Magnonic Holographic Memory[1] ALEXANDER KHITUN, University of California Riverside, ALEXANDER KOZHEVNIKOV, Kotel'nikov Institute of Radioengineering and Electronics of Russian Academy of Sciences, Saratov Branch, FREDERICK GERTZ, University of California Riverside, YURI FILIMONOV, Kotel'nikov Institute of Radioengineering and Electronics of Russian Academy of Sciences, Saratov Branch — Collective oscillation of spins in magnetic lattice known as spin waves (magnons) possess relatively long coherence length at room temperature, which makes it possible to build sub-micrometer scale holographic devices similar to the devices developed in optics. In this work, we present a prototype 2-bit magnonic holographic memory. The memory consists of the double-cross waveguide structure made of $Y_3Fe_2(FeO_4)_3$ with magnets placed on the top of waveguide junctions. Information is encoded in the orientation of the magnets, while the read-out is accomplished by the spin waves generated by the micro-antennas placed on the edges of the waveguides. The interference pattern produced by multiple spin waves makes it possible to build a unique holographic image of the magnetic structure and recognize the state of the each magnet. The development of magnonic holographic devices opens a new horizon for building scalable holographic devices compatible with conventional electronic devices.

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