

Abstract Submitted
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Ferromagnetic cross junction based spin wave logic device¹

ALEXANDER KOZHANOV, Georgia State University — Spin wave based signal processing/logic devices have long history of development and exploration. Typically the spin wave phase is used to encode the input information. Spin wave interference is used to produce the device output in form of the spin wave amplitude. Electronic amplitude-to-phase signal converter is required to build a logic gate capable of providing necessary fan-out. In case of destructive interference the phase information is lost and a “new” wave should be excited at the next logic stage. In this work we demonstrate the spin wave interference in ferromagnetic CoTaZr cross and propose a spin wave logic device based on this structure. Two neighboring arms of the cross serve as the device inputs. For the certain input wave phase offsets the interference is constructive in one output arm of the cross while destructive in another and vice versa thus resulting in a phase controlled spin wave switching. The output waves in the cross arms have different phase offsets dependent on the input wave phase offset. By merging the spin waves scattered into the cross output arms the device output is formed with a wave phase following the OR/NOR logic operation. We model local spin wave scattering in the cross center and discuss the effect of the local spin wave modes in the cross junction on the proposed device operation.

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