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Signal propagation in time-dependent spin transport¹

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Kaiserslautern — Signal propagation in magnetic multilayers is studied
using a macroscopic theory of time-dependent spin transport. Our anal-
ysis shows that time-dependent spin transport possesses a wave-diffusion
duality, i.e., it is wave like for fast signal modulation and reduces to the
diffusion equation for slow modulation [1]. The wave-like characteristics
allow us to extract a finite spin signal-propagation velocity, which can-
not be done using the spin diffusion equation. Applications to different
switching scenarios for collinear and noncollinear spin transport through
magnetic multilayers will be discussed.

[1] Y.-H. Zhu, B. Hillebrands, H. C. Schneider, Phys. Rev. B **78**, 054429
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