Generation of spin current by spin pumping under nonlinear magnetization dynamics

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In the field of spintronics, a spin current, a flow of spin angular momentum, is expected to be used in carrying and processing information [1]. Various methods of generating spin currents have been developed and investigated. The investigations, however, have been restricted to linear regime; spin-current generation in nonlinear regime has been hardly investigated despite the potential applications [2]. One of the versatile methods of generating spin currents is a spin pumping technique, which injects spin current from magnetization dynamics across a ferromagnet / normal metal interface. In this work, we investigated spin-current generation via the spin pumping under nonlinear magnetization dynamics.

The experimental set-up is shown in Fig. 1, where the sample consists of ferrimagnet YIG and normal metal Pt. Above a threshold of the incident microwave power, the nonlinear magnetization dynamics, known as magnon auto-oscillations, were observed as frequency modulations of the absorbed microwave by YIG (Fig. 2). In this presentation, we will discuss experimental investigations on the spin pumping by the nonlinear dynamics.

References